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STATE DOCUMENTS

RECONNAISSANCE STUDY

WOODVILLE

BOULDER

PREPARED BY
MONTANA STATE HIGHWAY COMMISSION
PRECONSTRUCTION DIVISION

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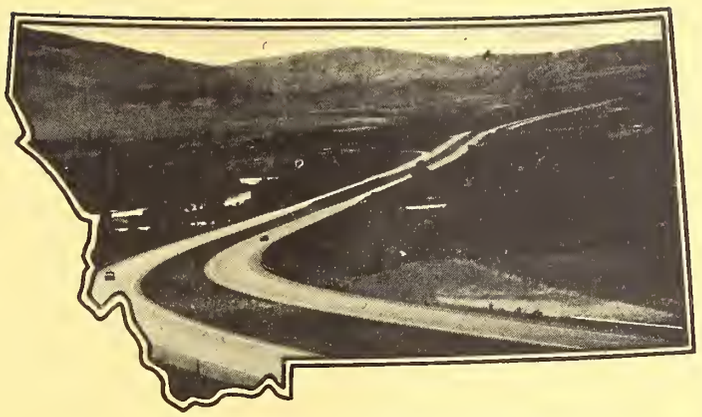

HELENA, MONTANA

TIM BABCOCK
GOVERNOR

PAUL M. JOHNSON
STATE HIGHWAY ENGINEER

RECONNAISSANCE STUDY

OF

INTERSTATE ROUTE 15

FROM

WOODVILLE

TO

BOULDER

PREPARED BY
MONTANA STATE HIGHWAY COMMISSION
PRECONSTRUCTION DIVISION

IN COOPERATION WITH
U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

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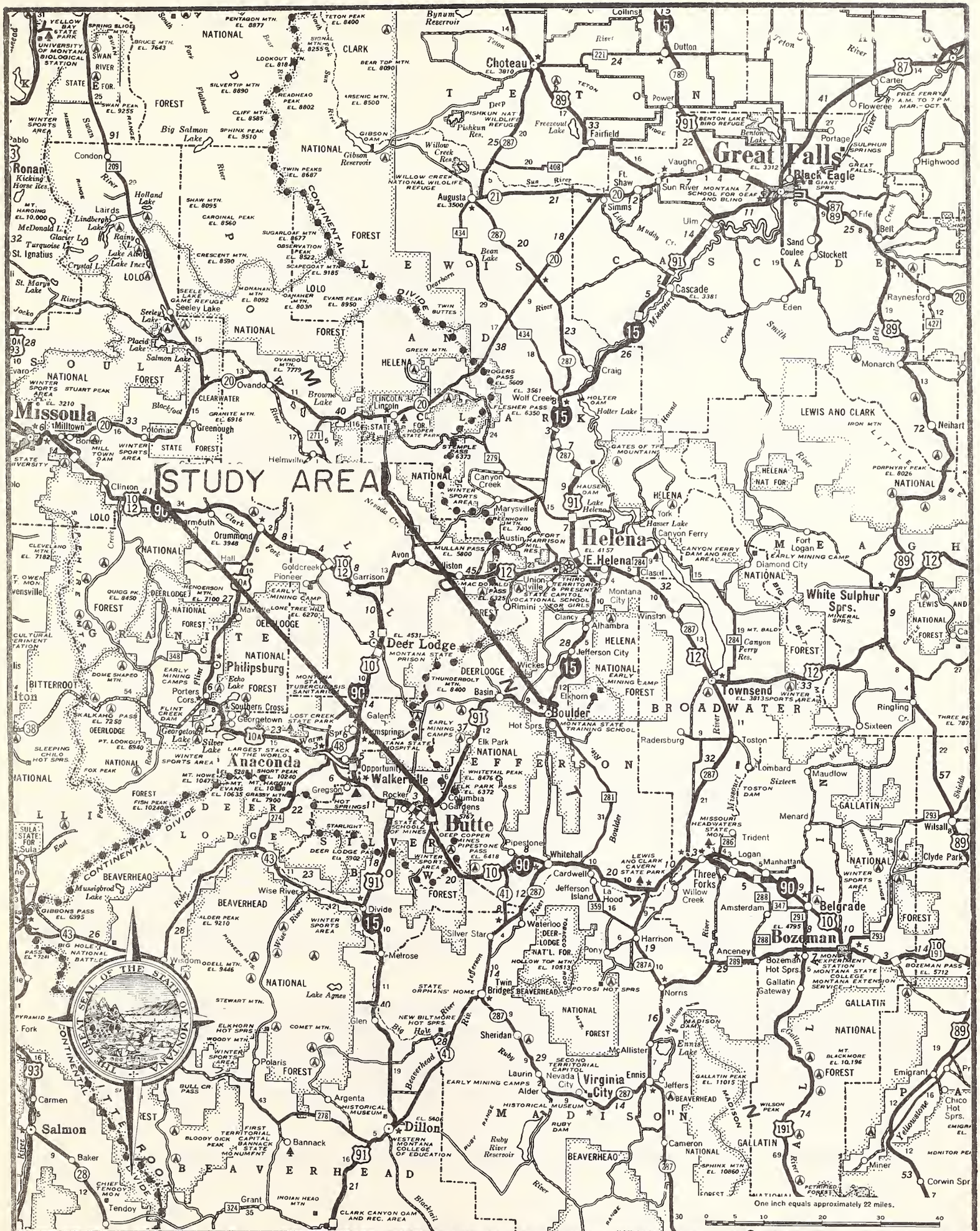
STUDY AREA
Missoula
Helena
Great Falls
Butte
Anaconda
Deer Lodge
Boulder
Townsend
Bozeman
Belgrade
Dillon
Virginia City
Salmon
Choteau
Ronan
Lolo
Seeley Lake
Ovando
Clinton
Drummond
Philipsburg
Hall
Goldcreek
Garrison
Avon
Helmville
Wolf Creek
Craig
Cascade
Augusta
Fairfield
Simms
Sun River
Vaughn
Ft. Shaw
Black Eagle
Belt
Fife
Monarch
Neihart
Raynesford
Eden
Stockett
Sand Coulee
Carter
Dutton
Collins
Power
Portage
Highwood
Floweree
Townsend
Radersburg
Toston
Sixteen
Ringling
Three Forks
Willow Creek
Manhattan
Logan
Trident
Gallatin
Menard
Wilsall
Clyde Park
Maudlow
Lombard
Amsterdam
Belgrade
Bozeman
Hot Sprs.
Gallatin Gateway
Anceney
Pony
Harrison
Norris
Ennis
McAllister
Jeffers
Cameron
Sheridan
Twin Bridges
Silver Star
Melrose
Divide
Wise River
Jefferson Island
La Hood
Cardwell
Whitehall
Pipestone
Basin
Elkhorn
Boulder
Jefferson City
Montana City
Clancy
Alhambra
Winston
Canyon Ferry
Hauser Lake
Lake Helena
Marysville
Austin
Rimini
Unionville
Wickes
Elk Park
Hot Sprs.
Rocker
Gregson
Opportunity
Walkerville
Galen
Georgetown
Southern Cross
Porters Cors.
Pioneer
Echo Lake
Silver Lake
Warm Spr
Basin
Clearwater
Potomac
Greenough
Bonner
Milltown
Lincoln
Ovando
Placid Lake
Salmon Lake
Seeley Lake
Lindbergh Lake
Holland Lake
Lairds
Condon
Swan River
Big Salmon Lake
Flathead
Swan
Bitterroot
Deer Lodge
Beaverhead
Madison
Jefferson
Gallatin
Lewis and Clark
Broadwater
Powell
Granite
Missoula
Ravalli
Lake
Sanders
Flathead
Lincoln
Teton
Pondera
Glacier
Toole
Liberty
Hill
Blaine
Phillips
Valley
Roosevelt
Sheridan
Daniels
Richland
Dawson
Prairie
Wibaux
Fallon
Carter
Custer
Rosebud
Treasure
Big Horn
Yellowstone
Stillwater
Sweet Grass
Park
Meagher
Golden Valley
Musselshell
Wheatland
Fergus
Petroleum
Judith Basin
Cascade
Chouteau
Blaine
Hill
Liberty
Toole
Pondera
Glacier
Teton
Lewis and Clark
Broadwater
Powell
Granite
Missoula
Ravalli
Lake
Sanders
Flathead
Lincoln
One inch equals approximately 22 miles.
0 5 10 20 30 40
SITUATION MAP

FOREWORD

This report has been prepared to compare the relative merits of alternate routes for I 15, between Woodville and Boulder.

Woodville is a railroad siding near the top of the Continental Divide, north of Butte, and Boulder is a town of approximately 1400 people midway between Butte and Helena. Terrain dictates that Woodville and Boulder be control points for the routing of I 15 between Butte and Helena.

The two major routes considered feasible between Woodville and Boulder are included in this study. They are referred to as the "Basin Line" and the "Nez Perce Line". A description of each follows.

DESCRIPTION OF ALTERNATES

Basin Line

The "Basin Line" essentially follows existing U.S. 91 and the G. N. Ry. through the limits of the study. This is also the natural drainage course between between Woodville and Boulder.

Proceeding northerly from Woodville the "Basin Line" parallels U.S. 91 across approximately 10 miles of flat to rolling terrain commonly referred to as Elk Park Flats.

At the northerly end of Elk Park Flats the "Basin Line" enters Bison Canyon and it follows it for approximately 7½ miles to Bernice where Bison Creek flows into the Boulder River. The southerly 5± miles of Bison Canyon is extremely rugged terrain while the northerly 2½ miles is relatively moderate.

From Bernice the "Basin Line" proceeds easterly following the Boulder River to Basin, an early day mining town with a present population of approximately 300. The Boulder River canyon for the first 1½ miles west of Basin is extremely narrow and rugged. One horseshoe bend requires a 9° curve and a lengthy relocation of the G. N. Ry.

From Basin the alternate proceeds easterly following the Boulder River canyon to Boulder, where it skirts the westerly edge of town and terminates at the north common point approximately one mile north of Boulder. Although the Boulder River canyon between Basin and Boulder is quite crooked, the construction is relatively moderate compared to Bison Canyon and the narrow section just west of Basin.

The total length of the "Basin Line" between common points is approximately 31 miles.

Nez Perce Line

The "Nez Perce Line" would be on new location for most of the distance between Woodville and Boulder.

Proceeding northerly from Woodville the "Nez Perce Line" parallels U.S. 91 for a short distance then proceeds to the northeast and begins its south ascent towards Nez Perce Pass, a topographic control point on this alternate. The south ascent to Nez Perce Pass follows the Sawmill Gulch and Nez Perce Creek drainages. The 1000± foot climb is accomplished with a maximum grade of 5%.

Just northeast of Nez Perce Pass the alternate crosses a marshy area known as Little Boulder Park. Leaving the marshy area the "Nez Perce Line" proceeds northeasterly down the Little Boulder River Canyon towards Boulder. The 2400± foot descent down the Little Boulder River Canyon is accomplished on a 9± mile 5% grade.

At the bottom of the Little Boulder River Canyon the "Nez Perce Line" leaves the Little Boulder River drainage and proceeds northerly towards Boulder and the Boulder River drainage.

The alternate goes thru the west side of Boulder (approximately four blocks west of Main Street) and terminates at the north common point approximately one mile north of Boulder.

With the exception of some 5± miles on each end and the marshy area near the summit, the terrain encountered on the "Nez Perce Line" is extremely rugged and mountainous.

The total length of the "Nez Perce Line" between common points is approximately 24 miles.

INTERCHANGES

Interchanges as included on both alternates are considered appropriate to serve the needs of the local traffic and the areas thru which the alternates pass.

Basin Line

Five interchanges are included on the "Basin Line". They are at Woodville, Bernice, Basin, Galena Gulch and Boulder.

The Woodville Interchange would be located just north of the Continental Divide to serve the existing primary highway into the northeast portion of Butte, and also furnish the only access to the interstate from Elk Park Flats and the surrounding area.

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https://archive.org/details/reconnaissancest1966mont

The Bernice Interchange would be located near the mouth of Bison Creek. The main local road which this interchange would serve comes from Deer Lodge, via Champion Pass and the upper Boulder River valley. Besides serving the upper Boulder River valley, principally a ranching, mining and recreation area, the Bernice Interchange would furnish access to the road serving the Red Rock Creek drainage.

The Basin Interchange would be located just east of Basin to minimize the right-of-way damage thru the town. Besides serving the town of Basin, this interchange would provide access to the Basin Creek road, the Cataract Creek road and other minor local roads in the area.

An interchange would be provided near the mouth of Galena Gulch to serve the Galena Gulch road and the High Ore Creek road which intersects U.S. 91 from the north approximately 1¼ miles west of the interchange. The High Ore Creek road serves the town of Comet, a once thriving but now only slightly inhabited mining town located in the mountains approximately 4 miles north of U.S. 91.

The Boulder Interchange would be located along the westerly outskirts of the town. Besides serving Boulder and the surrounding area, the Boulder Interchange would also be the northerly access point for Montana 281 (Boulder-Cardwell Secondary).

Nez Perce Line

Only three interchanges are included on the "Nez Perce Line".

Like the "Basin Line" the "Nez Perce Line" would have interchanges at Woodville and Boulder, which in addition to their other uses would be the southerly and northerly access points for the existing primary highway thru Basin.

Because of the nature of the terrain and the lack of development along the route, only one interchange would be provided between Woodville and Boulder. This would be located near Moose Creek, approximately 5 miles northeast of Nez Perce Pass. This interchange would replace access to the upper Little Boulder Canyon that the interstate construction would cut off.

REST AREA

A dual rest area facility is planned between Woodville and Boulder. On the "Nez Perce Line" the rest area would be provided at the edge of the marshy area near the summit and on the "Basin Line" in one of the more open areas along Bison Canyon.

Also, an attempt will be made to add one or more scenic overlooks as might be appropriate under the current policy.

NUMBER OF LANES

The interstate between Woodville and Boulder is scheduled to be let to contract in 1969 and 1970, so for purposes of this study, 1990 has been used as the design year.

On the basis of the interstate design standards in effect at this time, the traffic anticipated in 1990 between Woodville and Boulder does not require four lane construction unless passing restrictions such as sustained steep grades and/or restrictive horizontal alignment are encountered.

The design year cost estimates included in this study are made on the basis of a two lane facility for the following areas:

Basin Line

Elk Park Flats	9.8± Miles
3± Miles south of Bernice to 2± miles west of Basin	5.1± Miles
2½± miles west of Boulder to North common point	3.7± Miles

Nez Perce Line

Elk Park Flats	3.5± Miles
2± miles south of Boulder to North common point	3.2± Miles

It is hoped that before the scheduled time of construction the standards might be changed to allow four lane construction throughout, therefore, appropriate four lane cost estimates are also included in this study.

GEOLOGY

Geological studies of both routes were made in an effort to determine how the geological conditions might affect the costs and/or methods of construction for whichever route might be chosen.

The entire area is within the limits of the Boulder batholith, a large intrusion of quartz monzonite. The accepted age of the batholith is Cretaceous.

After the close of the Cretaceous Period the entire area was subjected to prolonged and strong erosion. By Eocene time the entire area was eroded level to a summit penaplain.

This plain has since been uplifted and faulted. The batholith has been cut by numerous dikes and covered by lava flows, tuffs, and breccias. The present valleys are mostly controlled by faulting which has been extensive and relatively recent.

All valleys have steep walls and are narrow with relatively steep gradients. Exceptions are Elk Park Flats and the marshy area near Nez Perce Pass, which are remnants of the old summit penaplain.

Slides can be seen in the valley walls. One which is especially prominant can be seen from U.S. 91 south of the ranch buildings approximately one mile toward Basin from Bernice.

As the valleys are relatively recent the ultimate slope has not been reached, therefore, to be stable the backslopes must in general be flatter than the present valley walls.

For purposes of this study, 1½ to 1 cut slopes were used throughout except in the narrow portion of the canyon just west of Basin. In this area 1½ to 1 slopes do not catch within reasonable limits so backslopes equivalent to 1 to 1 were used. The final design through this area would probably have vertical or near vertical slopes with benches.

As the marshy area near Nez Perce Pass has some peat and poor drainage, subgrade problems could be expected.

Additional geological investigation with regard to individual backslope design and other special situations will be accomplished following route determination.

FACTORS CONSIDERED

The following is a brief discussion of information contained elsewhere in this report in the form of summaries and exhibits.

Construction Costs

As shown by the preliminary cost estimates included in this report, the section of I 15 between Woodville and Boulder will cost approximately twenty million dollars.

Both design year and four lane estimates are included for both routes. On the basis of the design year estimates the "Basin Line" would be approximately $600,000 less costly than the "Nez Perce Line", however, if four lanes were to be provided throughout initially the "Basin Line" would be estimated to cost approximately $800,000 more than the "Nez Perce Line".

As all planning and design must be done on the design year basis, the initial construction cost favors the "Basin Line".

Maintenance Costs

A summary of estimated annual maintenance costs is included in this report. Because of the adverse snow conditions anticipated and steeper grades encountered, it is assumed that the annual per mile maintenance costs would be considerably higher for the "Nez Perce Line"than for the "Basin Line".

Also, if the "Nez Perce Line" were to be built it can be safely assumed that sufficient traffic would remain on U.S. 91 to require its maintenance.

As shown in the summary the maintenance costs favor the "Basin Line".

Road User Costs

Using accepted unit operating costs for cars and trucks and including the effects of grades and curvature, individual vehicle travel costs between Woodville and Boulder were computed for both cars and trucks on the "Basin Line", the "Nez Perce Line" and existing U.S. 91.

These individual vehicle operating costs were then applied to the average traffic anticipated for the twenty years following construction. In this manner total annual operating costs were computed for both routes. These operating cost figures favor the "Nez Perce Line" quite strongly.

The practice of computing road user costs and weighing them against the other factors such as construction costs, maintenance costs, economic effects, etc., is normally a useful and reliable method in route analysis and selection.

Operating costs are a method of attempting to place a value on the costs to, and wishes of, the motorists who pay for and will eventually use the completed facility.

Normally the road user analysis serves as a method of determining whether or not the additional initial cost involved in providing a superior facility is economically justified.

The operating costs as computed would indicate the "Nez Perce Line" to be the better facility for the motorist. Because of the grades, snow conditions and other factors involved which will be discussed later, one seriously questions the validity of the operating cost approach in this situation.

This route study is basically a question of rise and fall (or grade) versus distance. That is, should the road go around the hill or over the hill?

The accepted unit road user costs that we use will nearly always favor the shorter route, no matter what the grades might be. This leads one to believe that perhaps these unit costs do not place the proper emphasis on the effects of rise and fall, and they certainly do not reflect the additional costs involved in operating a vehicle under the more adverse weather conditions encountered on a route at a higher elevation.

Truck Travel Times

As indicated by the summary of estimated truck travel times included in this report, an attempt has been made to estimate the time it would take a loaded truck to travel between Woodville and Boulder (both northbound and southbound) on both of the routes considered.

This summary indicates that the "Basin Line" would be the favored route of the trucker. The summary was made, assuming normal operating conditions. Wintertime driving conditions would no doubt favor the "Basin Line" more strongly.

It would be expected that the operating costs discussed above should reflect a difference in operating costs more in line with the estimated travel times.

Vertical Alignment

The vertical alignment is no doubt the most serious disadvantage of the "Nez Perce Line". Nearly 14 miles of 5% grade would be involved.

As shown by the summary of rise and fall included in this report, the "Nez Perce Line" would have a rate of rise and fall of approximately 3 feet per 100 feet as compared to approximately 1 foot per 100 feet on the "Basin Line". Rarely is this long a section of road encountered with this high a rate of rise and fall, especially where an alternate "water level" route is available.

At its 7350 foot elevation, "Nez Perce Pass" would be the highest on the interstate in Montana, in fact it would be approximately 1000 feet higher than the Continental Divide at Woodville.

Horizontal Alignment

As shown by the summary of horizontal alignment included in this report, both routes have poor horizontal alignment with the "Nez Perce Line" having slightly less deflection per mile.

The worst curve encountered is the 9° curve at the horseshoe bend just west of Basin. An alternate to this 9° curve around the point would be a 1900 foot tunnel thru the point. Although the tunnel was seriously considered, it was eliminated because of the excessive cost involved to serve the relatively low traffic anticipated.

Exposure

From the standpoint of roadway exposure to the wintertime sun, the "Basin Line" is the superior route.

The "Basin Line" would have some sections that would be shaded, but the "Nez Perce Line" would have practically all of its steep grades and sharp curves in the shade all winter.

Public Opinion

On May 30, 1965, a public hearing was held in Boulder to discuss the interstate routing between Woodville and Boulder. The large crowd in attendance was vehemently opposed to the Nez Perce alternate. In fact, there was no one in attendance who even felt the "Nez Perce Line" should be considered as an alternate.

Numerous petitions, briefs, etc., were presented at and following the hearing regarding this routing. These have been attached to the public hearing transcript for ready reference.

Economic Effect

It is the opinion of those concerned that the Nez Perce routing would have an adverse economic effect on the town of Basin and the surrounding area. Therefore, from the standpoint of the economy of the area the "Basin Line" is the favored routing.

Irrigation Project

One of the other disadvantages of the "Nez Perce Line" is the possibility of conflict with an irrigation project which is planned in the near future for the lower Boulder Valley.

The heart of this project is a storage reservoir to be constructed at the lower end of the Little Boulder River. This reservoir would affect approximately 1¾ miles of the "Nez Perce Line". For purposes of this study the "Nez Perce Line" thru the reservoir area has been so located to hold conflict to a minimum, however, if the "Nez Perce Line" were selected, complications could be anticipated.

Primary Improvement

It is difficult at this time to estimate how much traffic would remain on existing U.S. 91 if the "Nez Perce Line" were built, however, it is quite safe to assume that because of the local use and the undesirable features of the "Nez Perce Line", U.S. 91 would retain as much traffic as is encountered on some other primaries in the State which are currently being improved.

This could require the eventual improvement with primary or secondary funds of all or part of existing U.S. 91. Although no costs are included in this study for any such future improvements, the fact that they might be required should be considered in the final route determination.

Recreation

One of the factors which must be considered in route selection is the effect that the new facility will have on the recreation potential of the area.

The upper Little Boulder River and the surrounding terrain is virtually a virgin wilderness. Although this semi-wilderness area has no official designation as such, it has escaped the ravages of civilization with the exception of a power line and some early day mining activity. The mines have been closed for years and time has fairly well healed the scars.

The area is quite scenic in its present state and wild game (deer, elk, moose, bear, etc.) is abundant. Fishing for pan size (and larger) trout in the Little Boulder River is good. Although vehicular access to parts of the area is poor, it is a haven for the more ambitious sportsman.

Scenic terrain is also encountered on the "Basin Line" but the advance of civilization has already taken its toll. Bison Creek and the Boulder River have been changed and rechanged thru railroad construction, highway construction, and mining activity.

Both routes with their accompanying channel changes, etc., have been reviewed by the Montana Fish and Game Department and they feel that the "Basin Line" would cause significantly less harm than the "Nez Perce Line".

RECOMMENDATIONS

On the basis of the information presented in this study, it is recommended that the "Basin Line" be adopted as the routing for I 15, between Woodville and Boulder.

SUMMARIES

DESIGN YEAR COST ESTIMATE - BASIN LINE

DESIGN YEAR COST ESTIMATE - NEZ PERCE LINE

FOUR LANE COST ESTIMATE - BASIN LINE

FOUR LANE COST ESTIMATE - NEZ PERCE LINE

ESTIMATED ANNUAL MAINTENANCE COSTS

ESTIMATED TRAFFIC AND OPERATING COSTS

ESTIMATED TRUCK TRAVEL TIMES

HORIZONTAL CURVATURE

RISE AND FALL

TYPICAL SECTIONS

BASIN LINE

PRELIMINARY DESIGN YEAR COST ESTIMATE

31.17 Miles - 18.63 Miles 2-Lane - 2.56 Miles 70 ft. Ctrs. - 9.98 Miles 32 ft. Ctrs.

Clear and Grub	10 Miles @ $50,000	$ 500,000
Grading	9,800,000 Cu. Yds. @ $1.00	9,800,000
Drainage	18.6 Miles @ $15,000	279,000
	12.6 Miles @ $20,000	252,000
Base & Surface	18.6 Miles @ $70,000	1,302,000
	2.6 Miles @ $120,000	312,000
	10.0 Miles @ $110,000	1,100,000
Interchanges	5 @ $100,000	500,000
Structures	Lump Sum	1,530,000
Frontage Road	7.6 Miles @ $20,000	152,000
Signing	31.2 Miles @ $500	16,000
Fencing	62.3 Miles @ $3,600	224,000
Guardrail	10.3 Miles @ $15,000	154,000
Median Rail	10.0 Miles @ $20,000	200,000
Rest Area	Lump Sum	100,000
Seed & Mulch	21 Miles @ $1,000	21,000
Railroad Relocation	4300 ft. @ $10	43,000
Sub-total		$ 16,485,000
Engineering & Contingencies (15% of Sub-total)		2,473,000
Right-of-Way & Utilities		962,000
Total Estimated Cost		$ 19,920,000

NEZ PERCE LINE

PRELIMINARY DESIGN YEAR COST ESTIMATE

24.07 Miles - 6.65 Miles 2-Lane - 17.42 Miles 4-Lane 32 ft. Ctrs.

Clear and Grub	17 Miles @ $50,000	$ 850,000
Grading	12,200,000 Cu. Yds. @ $1	12,200,000
Drainage	6.7 Miles @ $15,000	100,000
	17.4 Miles @ $20,000	348,000
Base and Surface	6.7 Miles @ $70,000	469,000
	17.4 Miles @ $110,000	1,914,000
Interchanges	3 @ $100,000	300,000
Structures	Lump Sum	278,000
Frontage Road	3.0 Miles @ $20,000	60,000
Signing	24.1 Miles @ $500	12,000
Fencing	48.1 Miles @ $3,600	173,000
Guardrail	12.6 Miles @ $15,000	189,000
Median Rail	17.4 Miles @ $20,000	348,000
Rest Area	Lump Sum	100,000
Seed & Mulch	7 Miles @ $1,000	7,000
Sub-total		$ 17,348,000
Engineering & Contingencies (15% of Sub-total)		2,602,000
Right-of-Way & Utilities		548,000
Total Estimated Cost		$ 20,498,000

BASIN LINE

PRELIMINARY 4 LANE COST ESTIMATE

31.17 Miles - 21.19 Miles 70 ft. Ctrs. - 9.98 Miles 32 ft. Ctrs.

Clear and Grub	10 Miles @ $50,000	$ 500,000
Grading	10,500,000 Cu. Yds. @ $1	10,500,000
Drainage	31.2 Miles @ $20,000	624,000
Base and Surface	21.2 Miles @ $120,000	2,544,000
	10.0 Miles @ $110,000	1,100,000
Interchanges	5 @ $100,000	500,000
Structures	Lump Sum	1,802,000
Frontage Road	7.6 Miles @ $20,000	152,000
Signing	31.2 Miles @ $500	16,000
Fencing	62.3 Miles @ $3,600	224,000
Guardrail	10.3 Miles @ $15,000	154,000
Median Rail	10.0 Miles @ $20,000	200,000
Rest Area	Lump Sum	100,000
Seed & Mulch	21 Miles @ $1,000	21,000
Railroad Relocation	4300 ft. @ $10	43,000
Sub-total		$ 18,480,000
Engineering & Contingencies (15% of Sub-total)		2,772,000
Right-of-Way & Utilities		962,000
Total Estimated Cost		$ 22,214,000

NEZ PERCE LINE

PRELIMINARY 4 LANE COST ESTIMATE

24.07 Miles - 6.65 Miles 70 ft. Ctrs. - 17.42 Miles 32 ft. Ctrs.

Clear and Grub	17 Miles @ $50,000	$ 850,000
Grading	12,500,000 Cu. Yds. @ $1	12,500,000
Drainage	24.1 Miles @ $20,000	482,000
Base and Surface	6.7 Miles @ $120,000	804,000
	17.4 Miles @ $110,000	1,914,000
Interchange	3 @ $100,000	300,000
Structures	Lump Sum	414,000
Frontage Road	3.9 Miles @ $20,000	78,000
Signing	24.1 Miles @ $500	12,000
Fencing	48.1 Miles @ $3,600	173,000
Guardrail	12.6 Miles @ $15,000	189,000
Median Rail	17.4 Miles @ $20,000	348,000
Rest Area	Lump Sum	100,000
Seed & Mulch	7 Miles @ $1,000	7,000
Sub-total		$ 18,171,000
Engineering and Contingencies (15% of Sub-total)		2,726,000
Right-of Way and Utilities		548,000
Total Estimated Cost		$ 21,445,000

SUMMARY OF ESTIMATED ANNUAL MAINTENANCE COSTS

Nez Perce Interstate	24 Miles @ $3,500	$ 84,000
U.S. 91	31 Miles @ $1,000	31,000
Total Nez Perce Line		$ 115,000

Basin Line	31 Miles @ $2,500	$ 78,000

SUMMARY OF ESTIMATED TRAFFIC

	1975 ADT	1980 ADT	1990 ADT
Nez Perce	1550	1780	2250
PTW	400	460	580
Basin	1950	2240	2830

All traffic figures include 12% trucks.

SUMMARY OF ESTIMATED OPERATING COSTS

Basin Operating Costs:

$ 3.10 x 1971 x 365	=	$ 2,230,186	(Car via Basin Interstate)
$ 9.13 x 269 x 365	=	896,429	(Truck via Basin Interstate)
		$ 3,126,615	

Nez Perce Operating Costs:

$ 2.40 x 1566 x 365	=	$ 1,371,816	(Car via Nez Perce Interstate)
$ 3.68 x 405 x 365	=	543,996	(Car via U.S. 91)
$ 8.31 x 214 x 365	=	649,094	(Truck via Nez Perce Interstate)
$ 11.17 x 55 x 365	=	224,238	(Truck via U.S. 91)
		$ 2,789,144	

SUMMARY OF ESTIMATED TRUCK TRAVEL TIMES

Northbound via Nez Perce Interstate

4 miles	@ 50 mph	4.8 Min.	Elk Park Flat
1½ miles	@ 35 mph	2.6 Min.	Fish Pond Area
3½ miles	@ 15 mph	14.0 Min.	Up Nez Perce Creek
1 mile	@ 50 mph	1.2 Min.	Flat Summit
9 miles	@ 30 mph	18.0 Min.	Down Little Boulder
5 miles	@ 50 mph	6.0 Min.	Boulder Area
24 miles		46.6 Min. (31 mph average)	

Northbound via Basin Interstate

10 miles	@ 50 mph	12.0 Min.	Elk Park Flat
2½ miles	@ 40 mph	3.8 Min.	Canyon
1½ miles	@ 30 mph	3.0 Min.	Down Grade
17 miles	@ 45 mph	22.7 Min.	Bernice, Basin, Boulder, etc.
31 miles		41.5 Min. (45 mph average)	

Northbound via Basin Primary

21 miles	@ 45 mph	28.0 Min.	
10 miles	@ 30 mph	20.0 Min.	
31 miles		48.0 Min. (39 mph average)	

SUMMARY OF ESTIMATED TRUCK TRAVEL TIMES

Southbound via Nez Perce Interstate

5	miles @ 45 mph	6.7 Min.	Boulder Area	
9	miles @ 15 mph	36.0 Min.	Up Little Boulder	
1	mile @ 50 mph	1.2 Min.	Flat Summit	
3½	miles @ 30 mph	7.0 Min.	Down Nez Perce Creek	
5½	miles @ 50 mph	6.6 Min.	Elk Park Flat	
24	miles	57.5 Min.	(25 mph average)	

Southbound via Basin Interstate

17	miles @ 45 mph	22.7 Min.	Boulder,Basin,Bernice,etc.	
1½	miles @ 15 mph	6.0 Min.	Up Grade	
2½	miles @ 30 mph	5.0 Min.	Canyon	
10	miles @ 50 mph	12.0 Min.	Elk Park Flat	
31	miles	45.7 Min.	(41 mph average)	

Southbound via Basin Primary

21	miles @ 45 mph	28.0 Min	
8	miles @ 30 mph	16.0 Min	
2	miles @ 15 mph	8.0 Min.	
31	miles	52.0 Min.	(36 mph average)

SUMMARY OF HORIZONTAL CURVATURE

	Basin Line	Nez Perce Line
Total Deflection	1950°	1396°
Average Deflection	62.6° per mile	58.0° per mile

Total Length of Alignment With a Curvature of:

	Basin Line	Nez Perce Line
1° and Sharper	10.34 miles	9.67 miles
2° and Sharper	7.38 miles	5.88 miles
3° and Sharper	4.53 miles	3.36 miles
4° and Sharper	3.18 miles	2.52 miles
5° and Sharper	2.85 miles	1.40 miles
6° and Sharper	2.35 miles	0.75 miles
7° and Sharper	2.35 miles	0.75 miles
9°	0.30 miles	----

SUMMARY OF RISE AND FALL

BASIN LINE

Total Rise and Fall	1,608	Feet
Total Length	164,575	Feet
Rate of Rise and Fall	0.98	Feet per Hundred Feet

NEZ PERCE LINE

Total Rise and Fall	3,810	Feet
Total Length	127,100	Feet
Rate of Rise and Fall	3.00	Feet per Hundred Feet

SUMMARY OF TYPICAL SECTIONS

BASIN LINE

Sta. 32+55 to Sta. 550+00± (Elk Park Flats)	9.8± miles	2 Lane	
Sta. 550+00± to Sta. 800+00± (Bison Canyon)	4.7± miles	4 Lane	32 ft. Ctrs.
Sta. 800+00± to Sta. 1070+00± (3± miles south of Bernice to 2± miles west of Basin)	5.1± miles	2 Lane	
Sta. 1070+00± to Sta. 1170+00± (2± miles west of Basin to Basin)	2.3± miles	4 Lane	32 ft. Ctrs.
Sta. 1170+00± to Sta. 1245+00± (Basin to 1½± miles east of Basin)	1.4± miles	4 Lane	70 ft. Ctrs.
Sta. 1245+00± to Sta. 1390+00± (1½± miles east of Basin to Galena)	3.0± miles	4 Lane	32 ft. Ctrs.
Sta. 1390+00± to Sta. 1450+00± (Galena to 2½ miles west of Boulder)	1.2± miles	4 Lane	70 ft. Ctrs.
Sta. 1450+00± to Sta. 1646+40 (2½± miles west to 1± mile north of Boulder)	3.7± miles	2 Lane	

NEZ PERCE LINE

Sta. 209+00 to Sta. 390+00± (Elk Park Flats)	3.5± miles	2 Lane	
Sta. 390+00± to Sta. 1310+00± (Nez Perce Cr. and Little Boulder Drainages)	17.4± miles	4 Lane	32 ft. Ctrs.
Sta. 1310+00± to Sta. 1480+00± (2± miles south to 1± mile North of Boulder)	3.2± miles	2 Lane	

All areas indicated as 2 lane for the design year are included as 4 lane-70 ft. Ctrs. in the 4 lane estimates.

EXHIBITS

VICINITY MAP

PROFILE

TYPICAL SECTIONS

VICINITY MAP
WOODVILLE—BOULDER
SCALE:
0 ½ 1 2 MILES

BASIN LINE

NEZ PERCE LINE

BERNICE

BOULDER RIVER

BASIN CREEK

CATARACT

BOULDER

NORTH COMMON POINT

TO HELENA

TO CARDWELL F.A.S. 281

TO WHITEHALL F.A.S. 399

LITTLE BOULDER RIVER

NORTH FORK LITTLE BOULDER

ELK PARK FLATS

ELK PARK INN

WOODVILLE

SOUTH COMMON POINT

BISON

BUTTE

WHITETAIL PARK

G.N.RY

BASIN

BOULDER

LITTLE BOULDER

WEST BOULDER RIVER

COMET

SUGARLOAF MOUNTAIN 6795

SULLIVAN MOUNTAIN 7245

POLE MOUNTAIN 7599

SHEEPSHEAD MOUNTAIN 7520

MANSTA MOUNTAIN 6827

BEAR MOUNTAIN 7245

MOUNT HOPPER 7425

Indian Head Rock

Kleinsmith Gulch

Sullivan Gulch

Bull Run Gulch

Butte Hill Jim Gulch

Galena Gulch

Little Galena Gulch

Bomerang

Porcupine Gulch

McGinley Gulch

Watson Gulch

Kilborn Gulch

Meyers Gulch

Spring Gulch

Hangerty Gulch

Soul

Mc Leod Gulch

La Belle Gulch

Upper Bear Gulch Meadows

Berrys Meadows

Wilder Gulch

Shamrock Gulch

Buttalo Creek

Headquarters Creek

Ferdinand Gulch

Lowland Gulch

Placer Gulch

Spades Gulch

Sweat Horn Gulch

Olson Gulch

Carson Gulch

Continental

Mouflon Preserve

Walkerville

Browns Gulch

Burns Run Creek

Lowland Creek

Divide Creek

Water

Galena

Boulder

Jim

Butte Hill

Bear

Long

Meadows

Berrys

Porcupine

Kilborn

Watson

Boulder

Bomerang

Galena

Little Galena

Sullivan

Indian Head Rock

Kleinsmith

Bull Run

Spring

Meyers

Hangerty

Soul

Mormon

Wilder

Shamrock

Buttalo

Headquarters

Ferdinand

Lowland

Placer

Spades

Sweat Horn

Olson

Carson

Continental

Mouflon

Browns

Burns Run

Lowland

Divide

Walkerville

Woody Hill

Butte

Whitetail

Beaver

Bigfoot

Slate

Boundary

Tarnham

Jefferson

Broadwater

Lewis and Clark

Gallatin

Madison

Park

Meagher

Wheatland

Golden Sunlight Mine

Basin

Cataract

Boulder

Bernice

Boulder River

Basin Creek

Cataract

Comet

Sugarloaf Mountain 6795

Sullivan Mountain 7245

Pole Mountain 7599

Sheepshead Mountain 7520

Manista Mountain 6827

Bear Mountain 7245

Mount Hopper 7425

Elk Park Flats

Elk Park Inn

Woodville

South Common Point

Bison

Butte

Whitetail Park

G.N.Ry

Basin

Boulder

Little Boulder

North Fork Little Boulder

West Boulder River

North Common Point

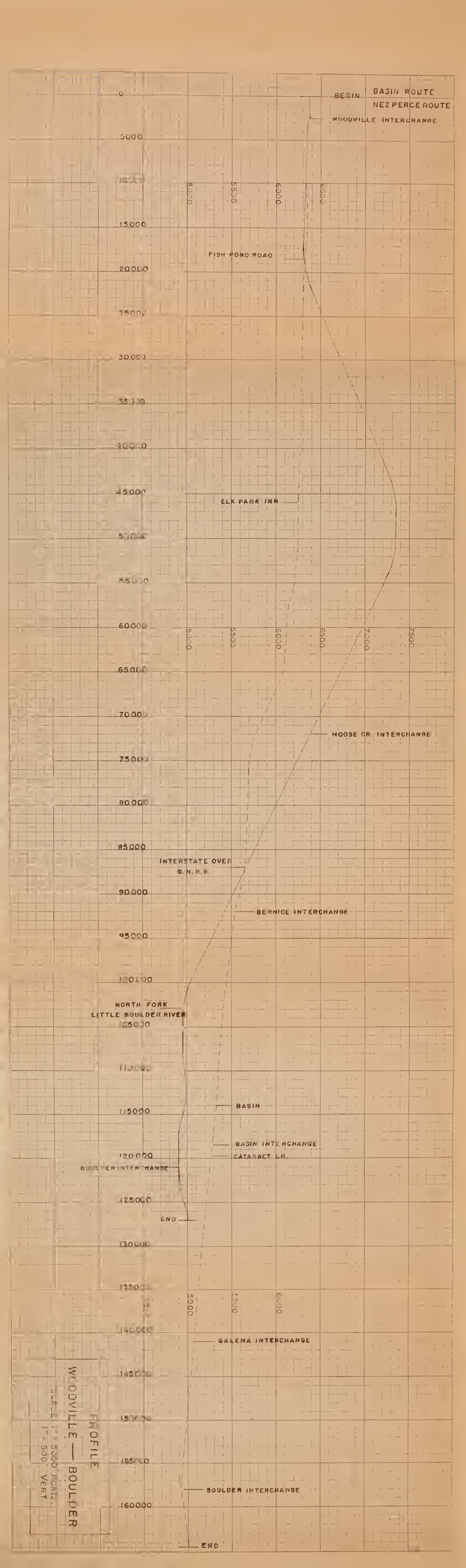
To Helena

To Cardwell F.A.S. 281

To Whitehall F.A.S. 399

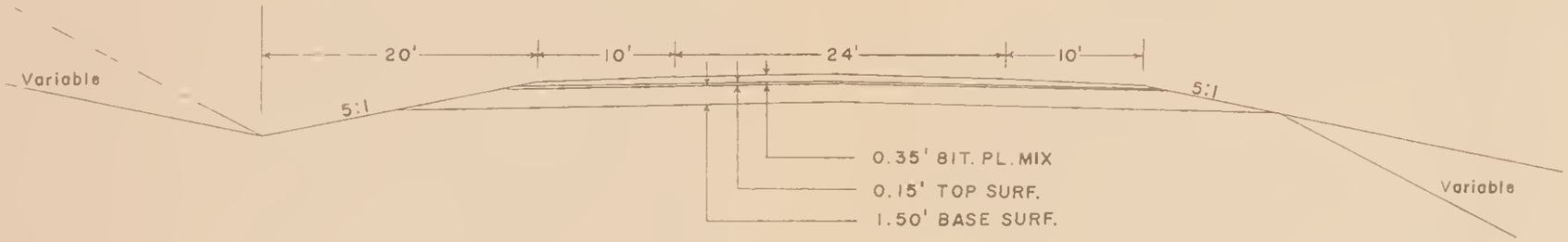
Nez Perce Line

Basin Line

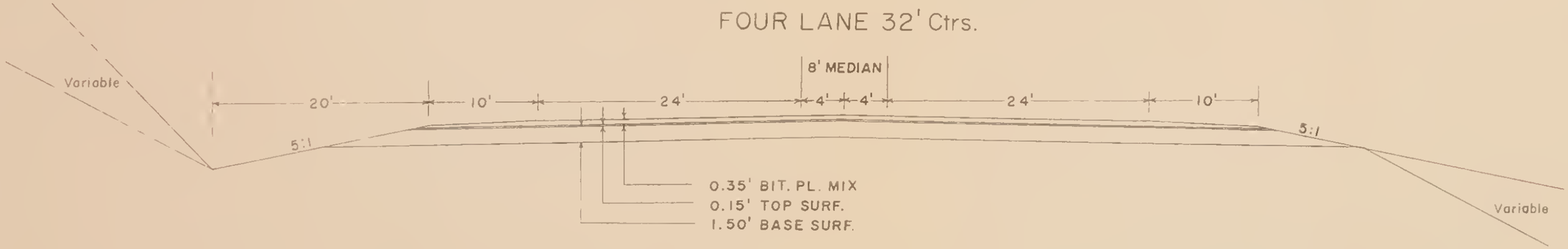

BEGIN
BASIN ROUTE
NEZ PERCE ROUTE
WOODVILLE INTERCHANGE
FISH POND ROAD
ELK PARK INN
MOOSE CR. INTERCHANGE
INTERSTATE OVER G.N.R.R.
BERNICE INTERCHANGE
NORTH FORK LITTLE BOULDER RIVER
BASIN
BASIN INTERCHANGE
CATARACT CR.
BOULDER INTERCHANGE
END
GALENA INTERCHANGE
BOULDER INTERCHANGE
END
WOODVILLE — BOULDER
PROFILE
SCALE: 1" = 5000' HORIZ.
1" = 500' VERT.

TYPICAL SECTIONS

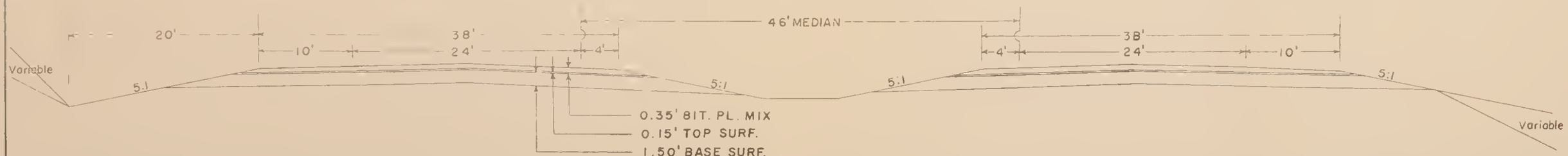
TWO LANE



FOUR LANE 32' Ctrs.



FOUR LANE 70' Ctrs.



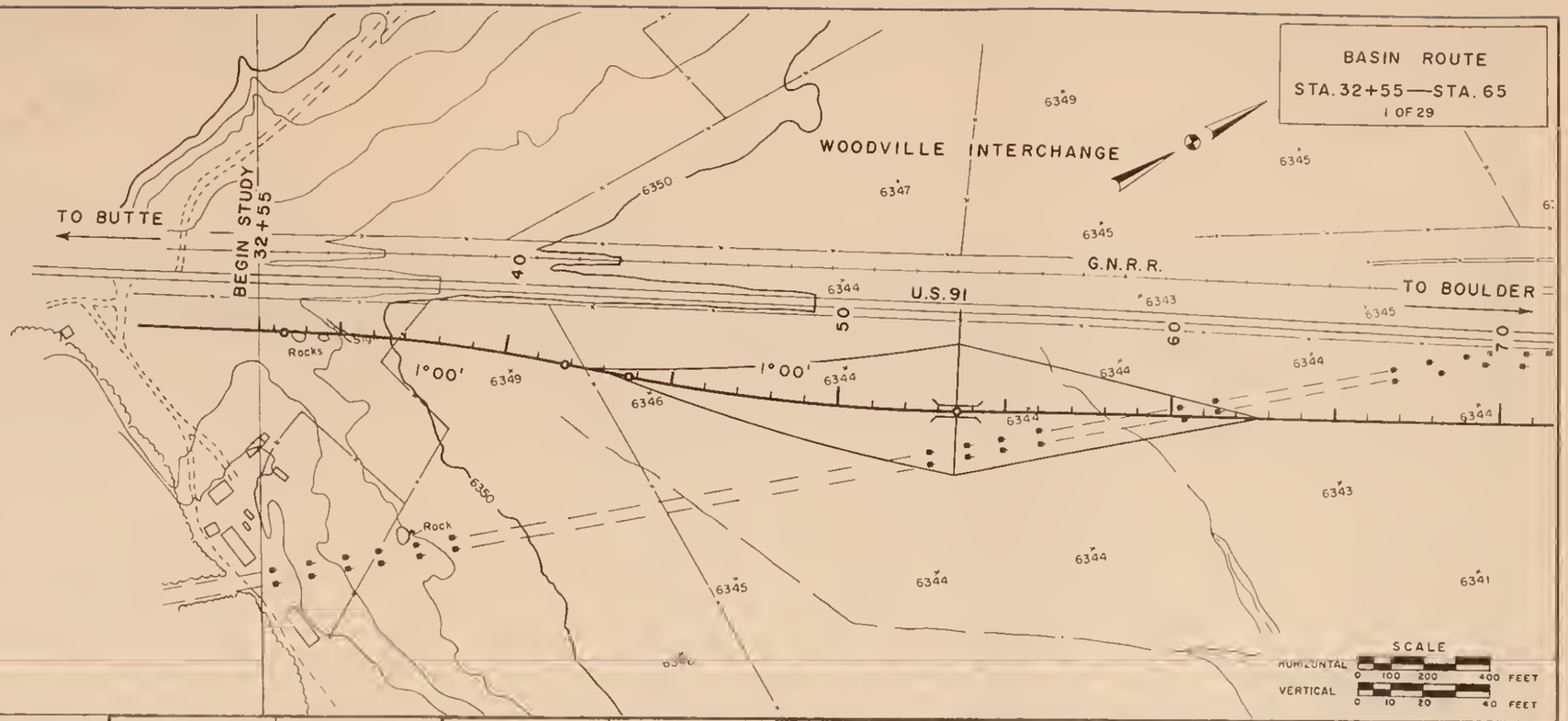
PLAN

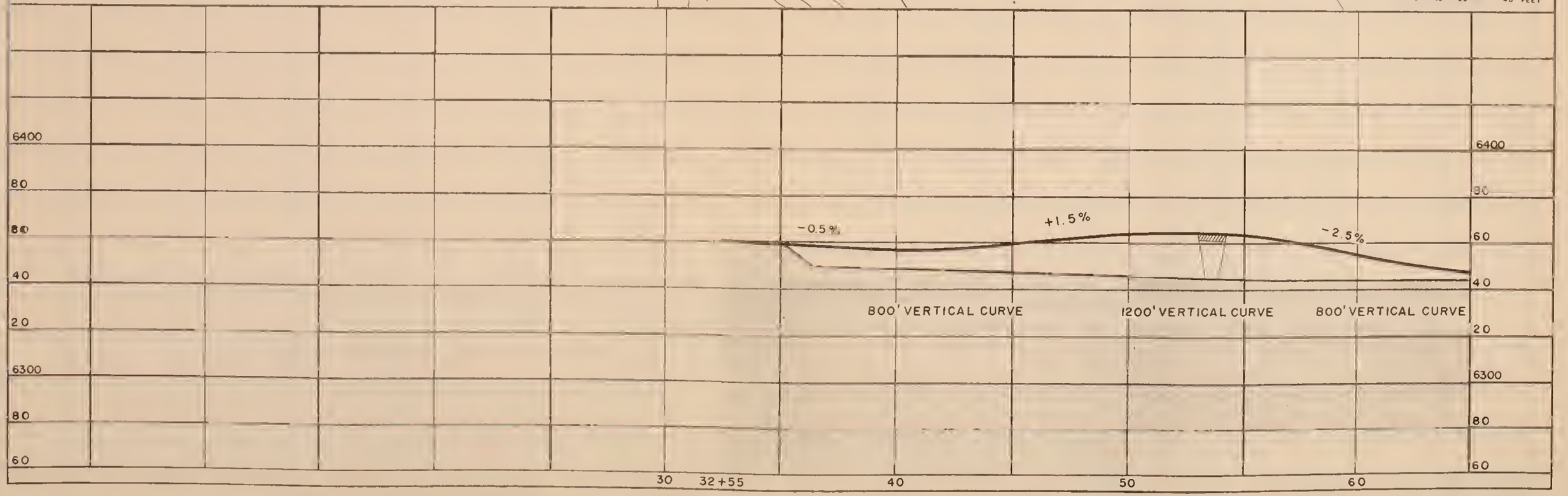
&

PROFILE

BASIN LINE

BASIN ROUTE
STA. 32+55 — STA. 65
1 OF 29





BASIN ROUTE
STA. 65 —— STA. 125
2 OF 29

G.N.RY.

U.S. 91

Shack

Abandoned

Grazing
Sub Irr.

0°30'

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

0.0%

−0.05%

800' VERTICAL CURVE

70 80 90 100 110 120

BASIN ROUTE
STA. 120 —— STA. 180
3 OF 29

G.N.R.R.

U.S. 91

0° 30'

Grazing (Sub Irr.)

Grazing (Sub Irr.)

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

−0.05 %

+0.2 %

800' VERTICAL CURVE

120 130 140 150 160 170 180

80 60 40 20 6300 80 60

BASIN ROUTE
STA. 175 —— STA. 235
4 OF 29

G.N.RY.

US 91

FRONTAGE ROAD

FISH POND ROAD

Grazing (Sub Irr.)

Grazing

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL

+0.2%

-0.7%

1600' VERTICAL CURVE

180 190 200 210 220 230

6300 40 60 80

BASIN ROUTE
STA. 235 —— STA. 295
5 OF 29

G.N.RY.

U.S. 91

FRONTAGE ROAD

Grazing

Grazing (Sub Irr.)

Signs

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.7%

-0.5%

800' VERTICAL CURVE

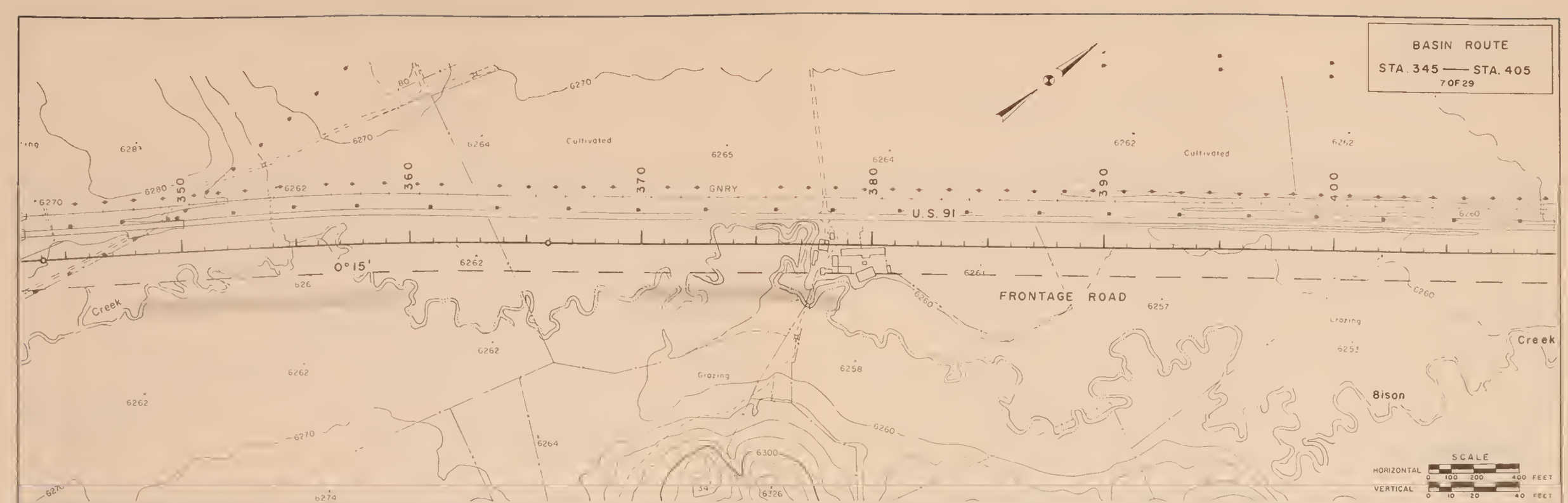
240 250 260 270 280 290

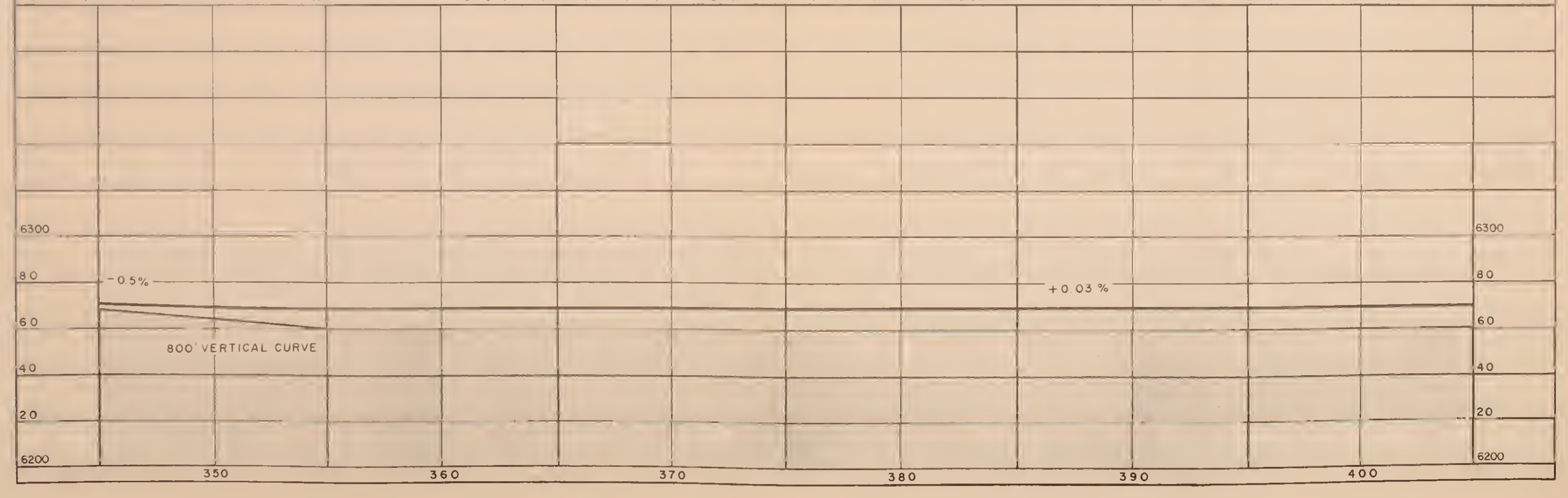
6300

BASIN ROUTE
STA. 290 —— STA. 350
6 OF 29

U.S. 91
G.N.RY.
FRONTAGE ROAD
Grazing
Grazing (Sub irr.)
Bison Creek
0°15'
Sign
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET
-0.5%
6300
80
60
40
20
6200
290
300
310
320
330
340
350

BASIN ROUTE
STA. 345 — STA. 405
7 OF 29


Cultivated
Cultivated
GNRY
U.S. 91
FRONTAGE ROAD
0°15'
Creek
Creek
Bison
Grazing
Grazing
6270
6280
6262
6264
6265
6262
6260
6261
6257
6253
6258
6262
6262
6262
6270
6264
6300
6260
6274
6326
34
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET



BASIN ROUTE

STA. 400 —— STA. 460

8 OF 29

G.N.R.

U.S. 91

CO. ROAD

FRONTAGE ROAD

Bison Creek

Grazing

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL

+ 0.03%

-0.3%

1200' VERTICAL CURVE

6300

80

60

40

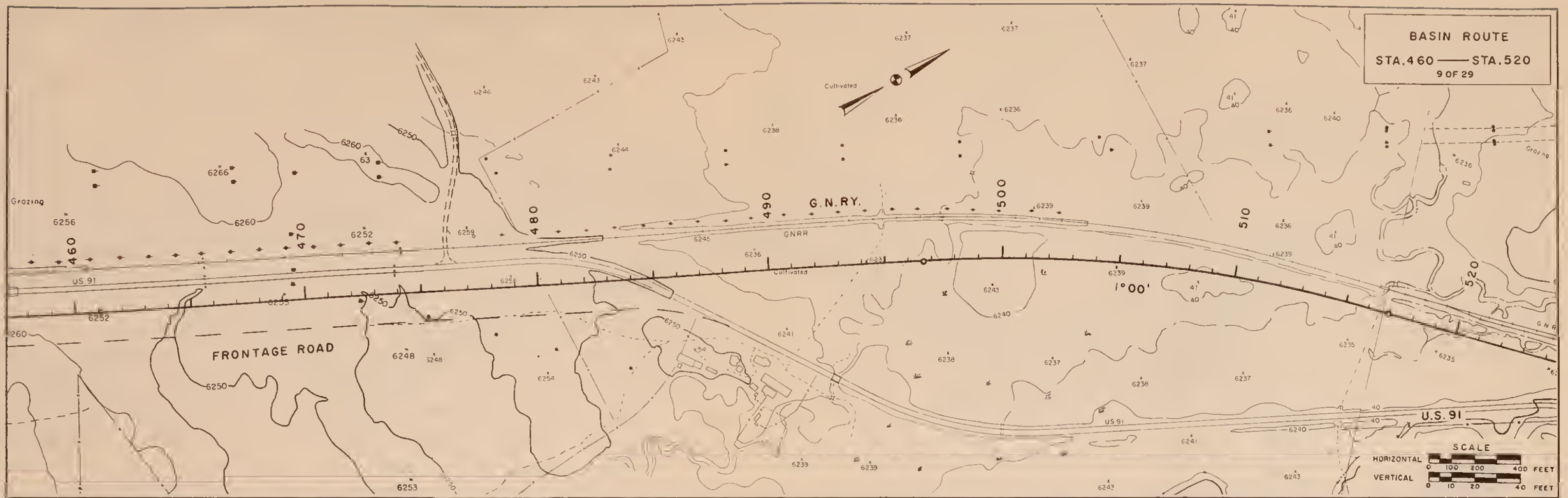
20

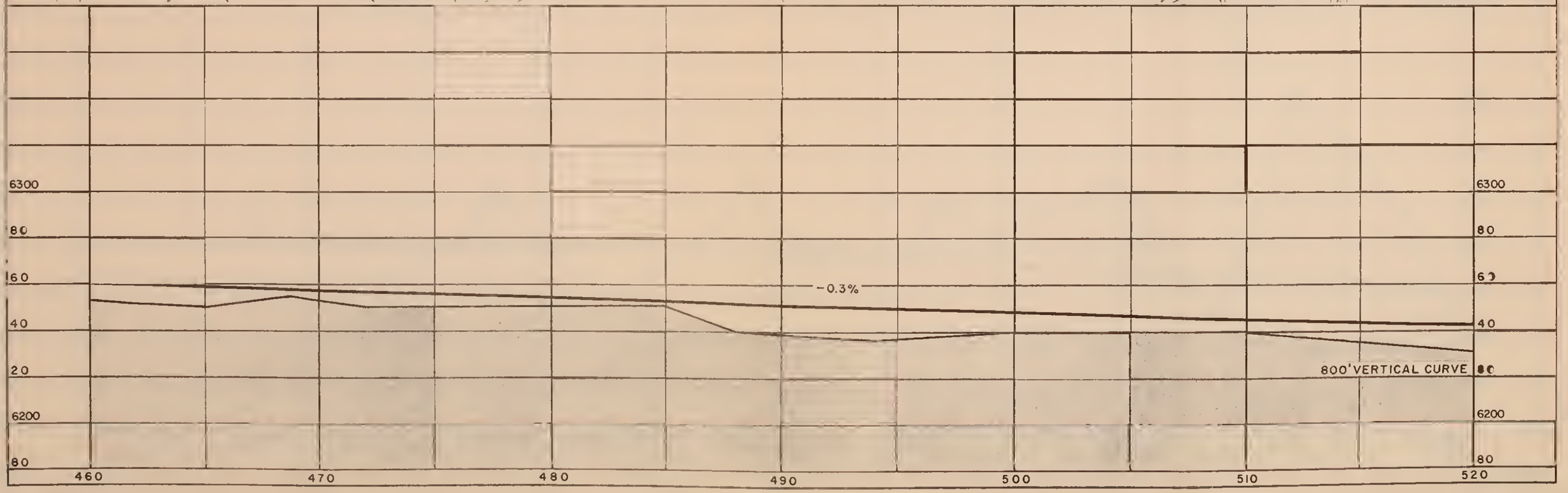
6200

80

400 410 420 430 440 450 460

BASIN ROUTE
STA. 460 —— STA. 520
9 OF 29





BASIN ROUTE
STA. 520 —— STA. 580
10 OF 29

Bison Creek
G.N.RY.
U.S. 91
ELK PARK INN
Stock Pile
6223 W S
Grazing
5°00'
7°30'
7°30'
520
530
540
550
560
570
580
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

0.0%
-0.5%
800' VERTICAL CURVE
800' VERTICAL CURVE
6300
6200
520
530
540
550
560
570
580

BASIN ROUTE
STA. 580 —— STA. 640
11 OF 29
SCALE
HORIZONTAL
0 100 200 400 FEET
VERTICAL
0 10 20 40 FEET
580
590
600
610
620
630
640
7°30'
7°00'
5°00'
2°30'
-3.0%
0.0%
800' VERTICAL CURVE
800' VERTICAL CURVE
G.N.RY.
U.S. 91
Bison
Creek
State Park
6200
6100
6300
6250
6350
6400
6450
6150
40
20
80
60

BASIN ROUTE
STA. 640 —— STA. 700
12 OF 29

Match Line

Match Line Sheet 4

Bison

G.N.RY.

Creek

U.S. 91

0° 30'

2° 00'

-0.4%

-5.0%

1000' VERTICAL CURVE

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

640 650 660 670 680 690 700

BASIN ROUTE

STA. 700 —— STA. 760

13 OF 29

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

G.N.RY.

Tunnel

U.S. 91

Bison

Creek

2°00'

5°00'

7°30'

700

710

720

730

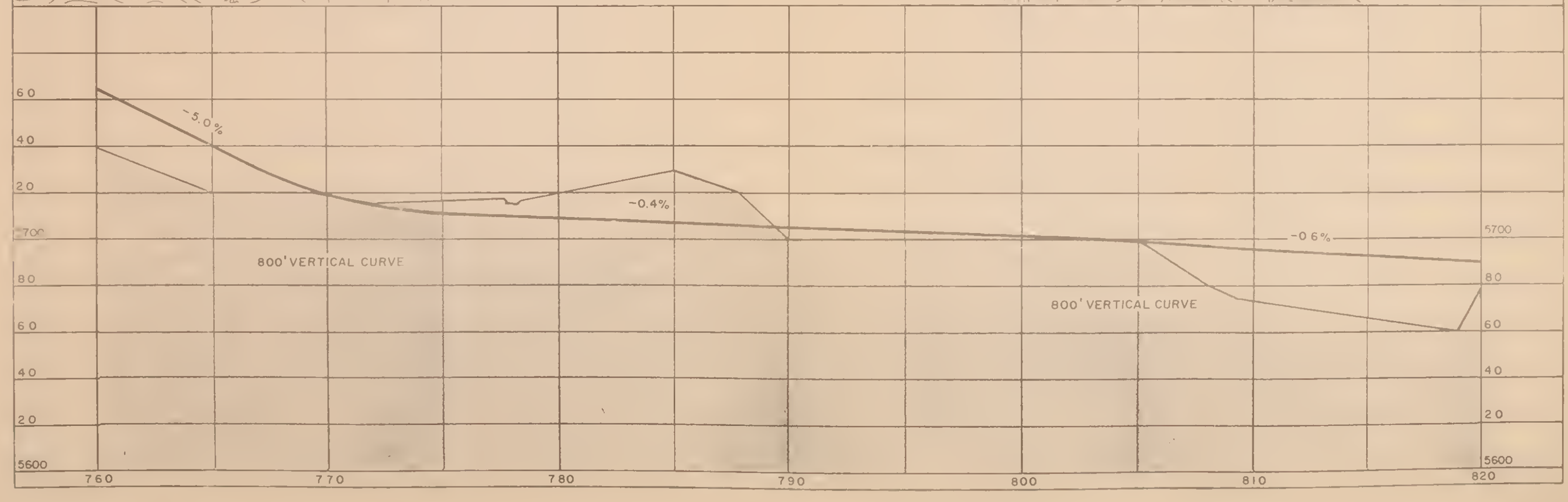
740

750

760

-5.0%

BASIN ROUTE
STA. 760 —— STA. 820
14 OF 29



BASIN ROUTE
STA. 820 — STA. 880
13 OF 29

G.N.RY.

U.S. 91

820 830 840 850 860 870 880

1°00' 0°30'

Bison Creek

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.6%

-2.2%

800' VERTICAL CURVE

5700 80 60 40 20 5600

BASIN ROUTE
STA. 880 — STA. 940
16 OF 29

880 890 900 910 920 930 940

2°30'
1°30'
G.N.RY.
Creek
Bison
U.S. 91

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-2.2 %
+1.4 %
-3.1 %
800' VERTICAL CURVE
1200' VERTICAL CURVE

60
40
20
5600
80
60
40
20
5500

880 890 900 910 920 930 940

BASIN ROUTE
STA. 940 — STA. 1000
17 OF 29

BERNICE INTERCHANGE

FRONTAGE ROAD

BOULDER RIVER

U.S. 91

3° 30'

Bison Creek

G.N.RY.

940 950 960 970 980 990 1000

HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

800' VERTICAL CURVE

-0.4%

-1.3%

800' VERTICAL CURVE

5600
80
60
40
20
5500

BASIN ROUTE
STA. 1000 — STA. 1060
18 OF 29

BOULDER RIVER

G.N.RY.

U.S. 91

.2°30'

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-1.3%

5500
80
60
40
20
5400

1000 1010 1020 1030 1040 1050 1060

BASIN ROUTE
STA. 1060 — STA. 1120
19 OF 29

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

RAILROAD REALIGNMENT

BOULDER RIVER

G.N.RY.

U.S. 91

1060 1070 1080 1090 1100 1110 1120

2°30' 9°00' 7°30' 2°00'

-1.3%

800' VERTICAL CURVE

-0.7%

1060 1080 1100 1120

BASIN ROUTE
STA 1120 — STA 1150
20 OF 29

1151+20 BK = 1130+00 AH

1130 1140 1150 1140

2°00' US 91 1°00' BOULDER

7°30'

RAILROAD REALIGNMENT

G.N.RY.

BASIN BASIN CREEK

FRONTAGE ROAD

RIVER

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.7%

1151+20 BK = 1130+00 AH.

-0.7%

60 40 20 5400 40 60 40 20 5300 80

1120 1130 1140 1150 1130 1140 1150

BASIN ROUTE
STA. 1150 — STA. 1210
21 OF 29

BASIN

BASIN

BASIN INTERCHANGE

CATARACT CREEK

FRONTAGE ROAD

FRONTAGE ROAD

1°30'

0°30'

U.S 91

G.N.RY.

Depot

RIVER

CREEK

BOULDER RIVER

1150 1160 1170 1180 1190 1200 1210

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.7%

-0.5%

-3.0%

800' VERTICAL CURVE

80 60 40 20 5300 80 40 20 5200

40 60 40 20 5300 40 60 40 20 5200

1150 1160 1170 1180 1190 1200 1210

BASIN ROUTE

STA 1210 —— STA 1270

22 OF 29

CATARACT CREEK

BOULDER RIVER

U.S. 91

G.N.RY.

3°00'

7°30'

7°30'

7°30'

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

-0.2 %

800' VERTICAL CURVE

-2.4 %

800' VERTICAL CURVE

+0.2 %

800' VERTICAL CURVE

1210 1220 1230 1240 1250 1260 1270

BASIN ROUTE

STA 1270 — STA. 1310

23 OF 29

U.S. 91

BOULDER

G.N.RY.

RIVER

1270

1280

1290

1300

1310

1320

1330

7°30'

1298+00 AH. =
1308+70 BK.

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

+0.2%

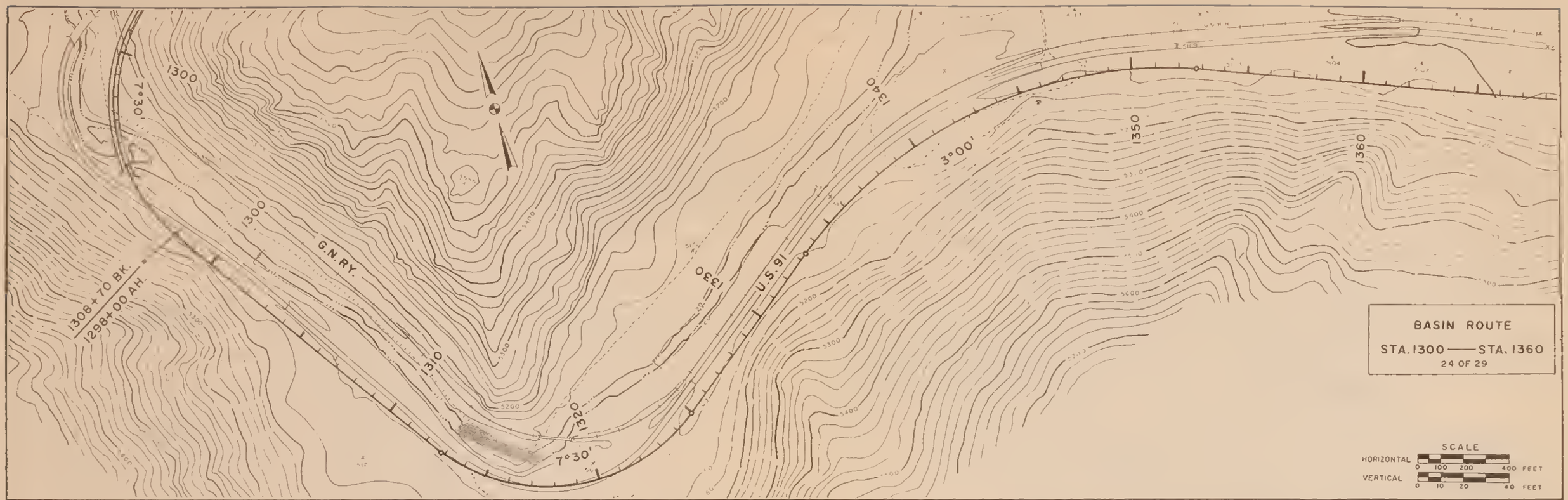
800' VERTICAL CURVE

-2.5%

1298+00 AH. =
1308+70 BK.

80
80
40
20
5200
80
60
40
20

1270 1280 1290 1300 1308+70 1300 1310


1308+70 BK. =
1298+00 AH.
7°30'
1300
1300
G.N.RY.
1310
1320
7°30'
1330
U.S. 91
1340
3°00'
1350
1360
BASIN ROUTE
STA. 1300 — STA. 1360
24 OF 29
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET
80
60
40
20
5200
80
60
40
20
5100
-2.5%
800' VERTICAL CURVE
-1.0%
1300
1310
1320
1330
1340
1350
1360

BASIN ROUTE
STA. 1360 — STA. 1420
25 OF 29

BOULDER

G.N.RY.

U.S. 91

RIVER

GALENA INTERCHANGE

3°30'

1°00'

1360 1370 1380 1390 1400 1410 1420

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-1.0%

+0.2%

800' VERTICAL CURVE

2200' VERTICAL CURVE

60 40 20 5100 80 60 40 20 5000

BASIN ROUTE
STA. 1420 —— STA. 1480
26 OF 29

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

BOULDER RIVER
G.N. RY.
GNRR
U.S. 91
2°30'
1°30'
-2.3%
-0.7%
800' VERTICAL CURVE
1420
1430
1440
1450
1460
1470
1480

BASIN ROUTE
STA. 1480 —— STA. 1540
27 OF 29

G.N.RY.

BOULDER RIVER

U.S. 91

1480 1490 1500 1510 1520 1530 1540

2° 30' 1° 30'

Gravel Pit

Cultivated Land

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.7%

4900 20 40 60

1480 1490 1500 1520 1530

BASIN ROUTE
STA. 1540 —— STA. 1600
28 OF 29

BOULDER

1540

1550

1560

1570

1580

1590

1600

3°30'

U.S. 91

RIVER

FRONTAGE ROAD

1°00'

BOULDER

BOULDER INTERCHANGE

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.7%

800' VERTICAL CURVE

60
40
20
4900
80
60

1540 1550 1560 1570 1580 1590 1600

BASIN ROUTE

STA. 1600 — STA. 1646+40

29 OF 29

BOULDER

1600

1610

2°00'

1620

1630

1640

1646+40

NORTH COMMON POINT

TO HELENA

U.S. 91

Cultivated Irrig

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

5000

20

60

40

20

4900

80

+3.0%

800' VERTICAL CURVE

1200' VERTICAL CURVE

1600 1610 1620 1630 1640 1646+40

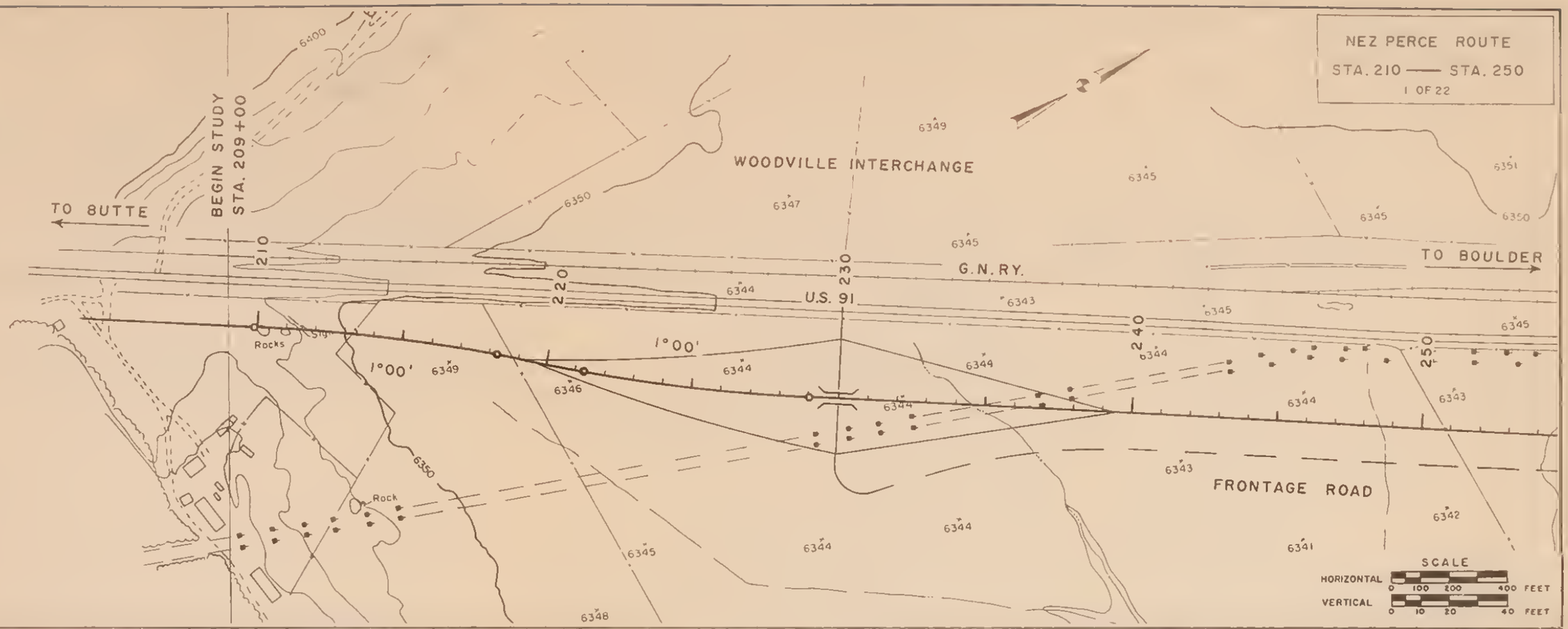
PLAN

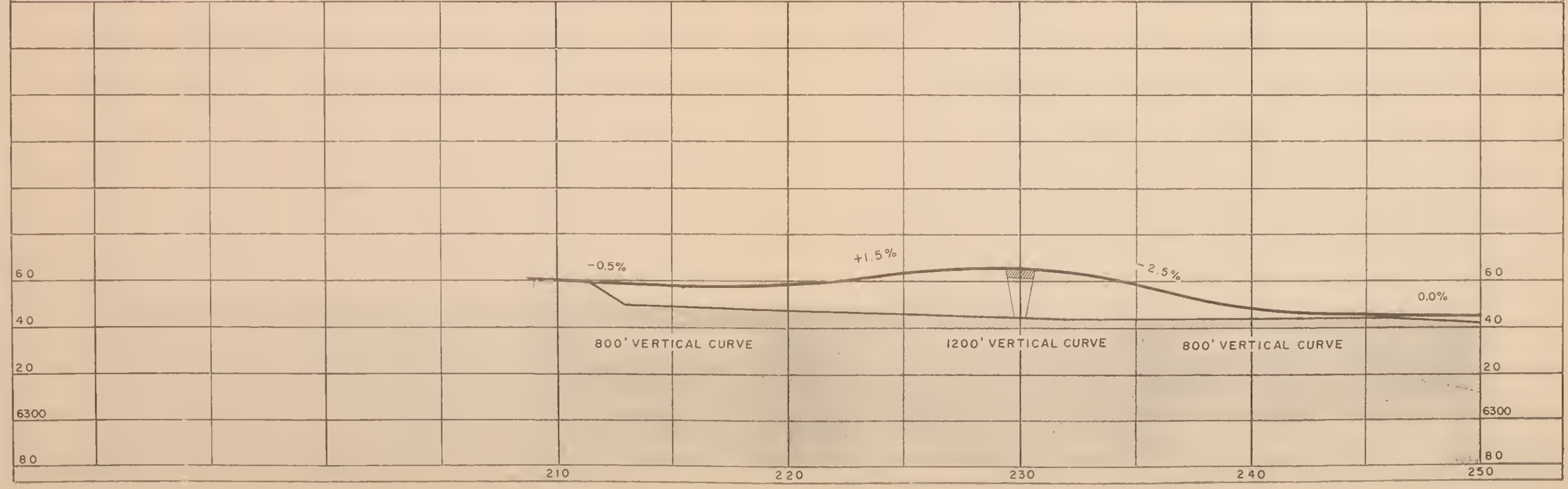
&

PROFILE

NEZ PERCE LINE

NEZ PERCE ROUTE
STA. 210 — STA. 250
1 OF 22





NEZ PERCE ROUTE
STA. 240 — STA. 300
2 OF 22

U.S. 91

FRONTAGE ROAD

Abandoned

Stock

Grazing (Sub Irr.)

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

0.0 %

240 250 260 270 280 290 300

NEZ PERCE ROUTE
STA. 300 —— STA. 360
3 OF 22

G.N.R.Y.

U.S. 91

FRONTAGE ROAD

1°00'

Grazing
(Sub Irr.)

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

-0.3%

6400
80
40
6300
80

300 310 320 330 340 350 360

NEZ PERCE ROUTE

STA. 360 — STA. 420

4 OF 22

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

380 TO U.S. 91

BEGIN "4" LANES

1°00'

FRONTAGE ROAD

FRONTAGE ROAD

FISH PONDS

W.S. 6300

-0.5%

+0.5%

+4.5%

800' VERTICAL CURVE

800' VERTICAL CURVE

360 370 380 390 400 410 420

6300

NEZ PERCE ROUTE
STA. 420 —— STA. 480
5 OF 22

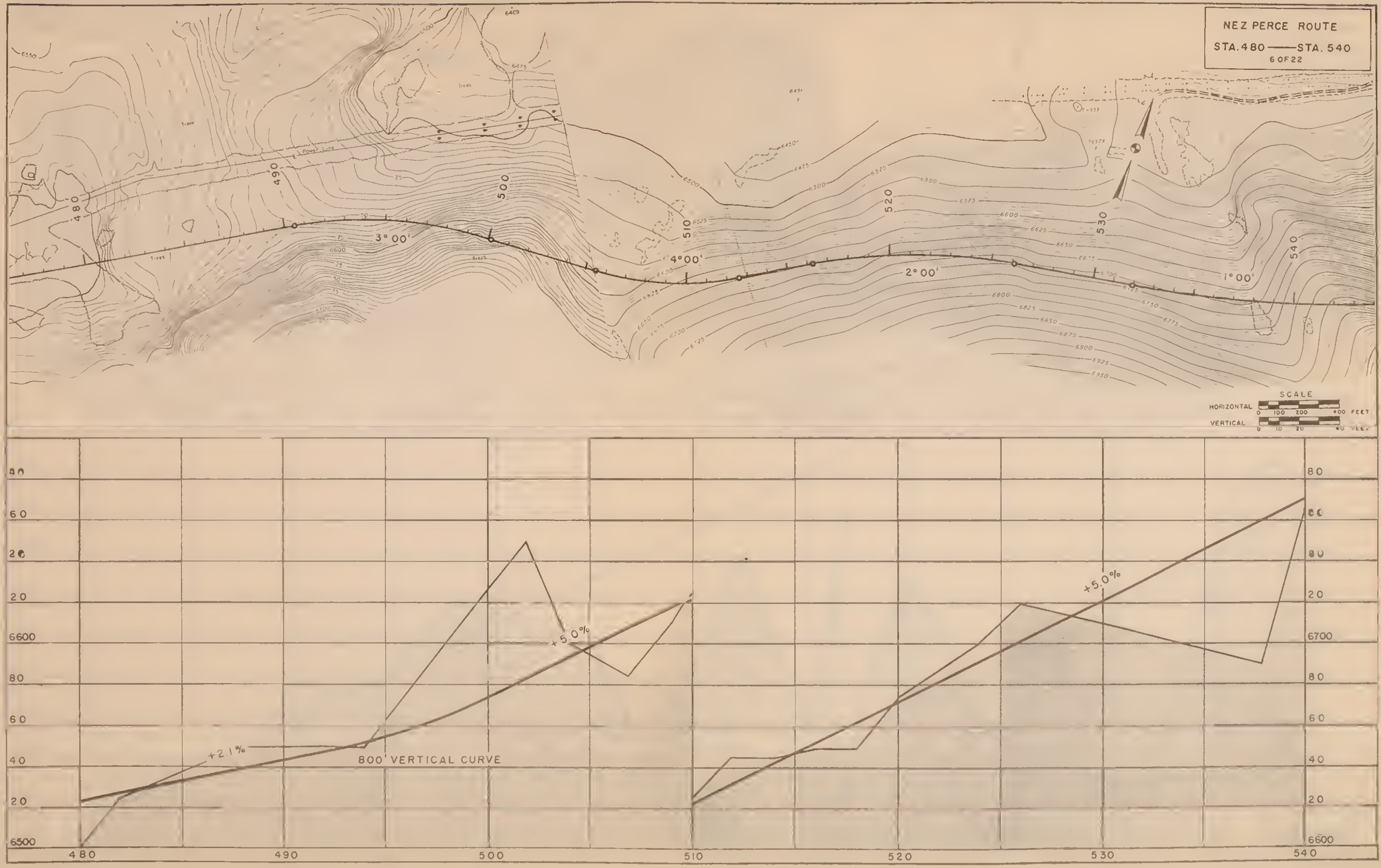
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

+4.5%
800' VERTICAL CURVE
+2.1%

NEZ PERCE ROUTE

STA. 480 —— STA. 540

6 OF 22



NEZ PERCE ROUTE

STA. 540 —— STA. 600

7 OF 22

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

540 550 560 570 580 590 600

1°00' 3°00' 5°00' 1°00'

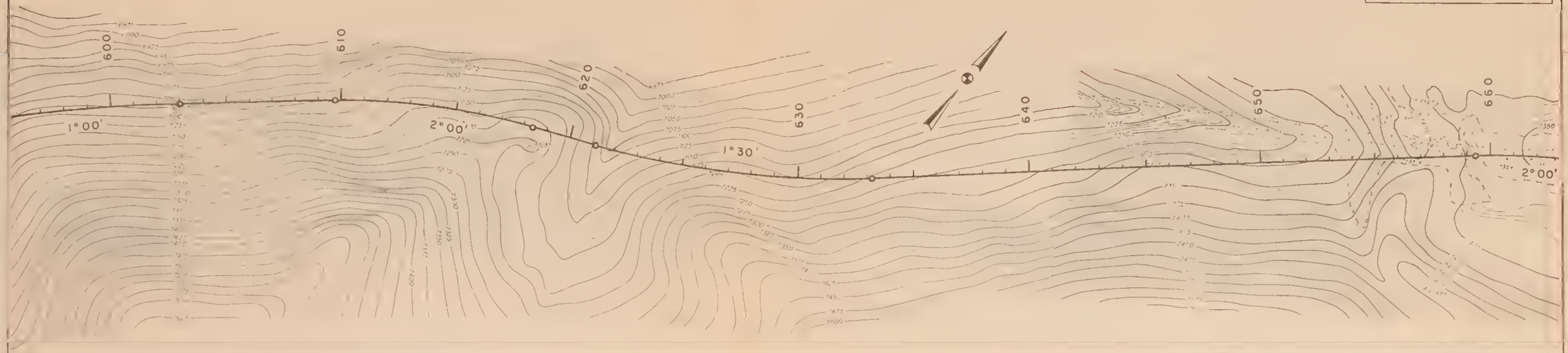
+5.0% +5.0%

6900 7000

NEZ PERCE ROUTE

STA. 600 —— STA. 660

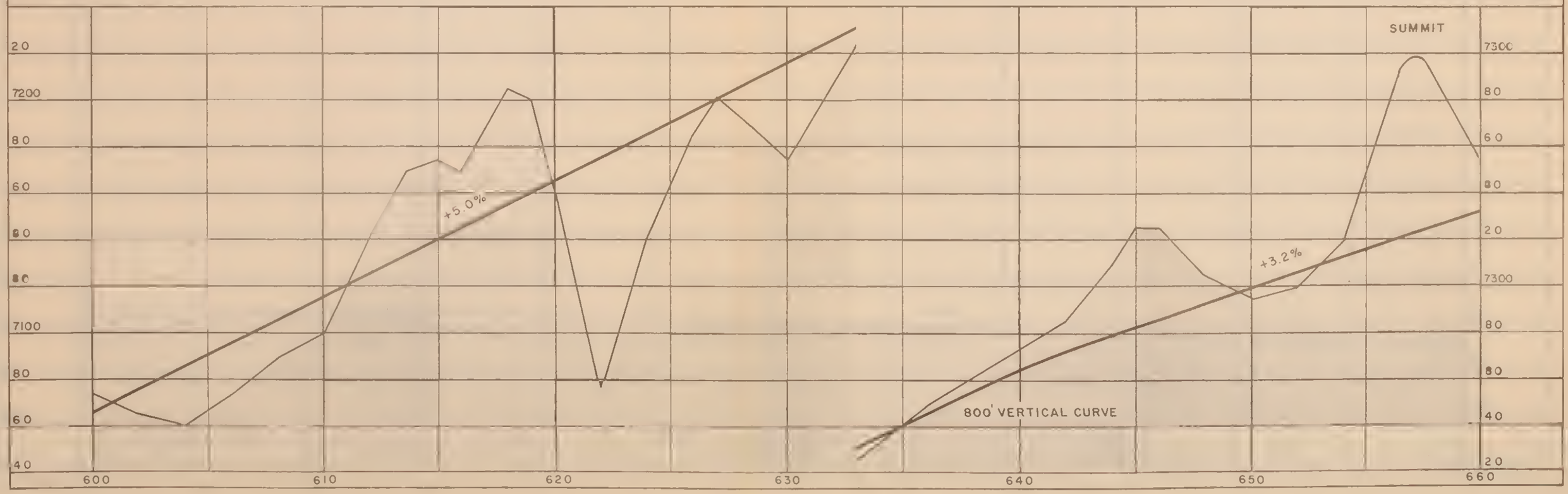
8 OF 22



SCALE

HORIZONTAL 0 100 200 400 FEET

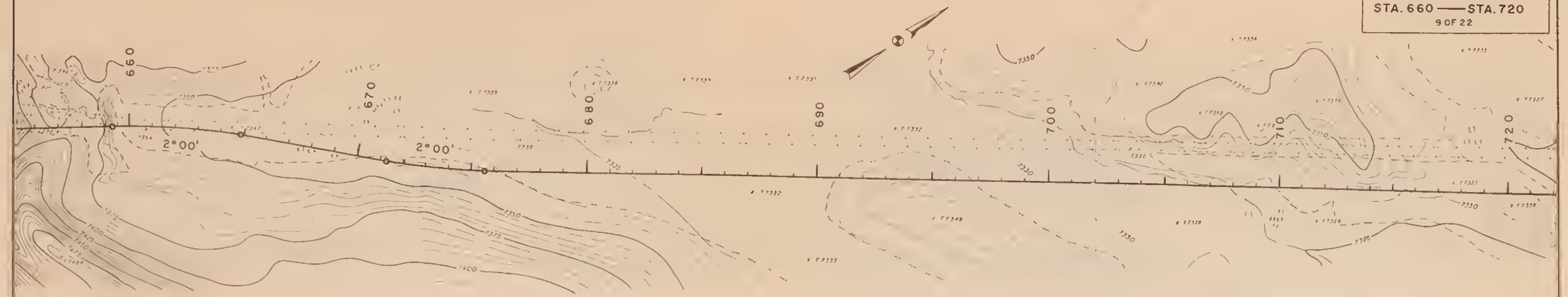
VERTICAL 0 10 20 40 FEET



NEZ PERCE ROUTE

STA. 660 —— STA. 720

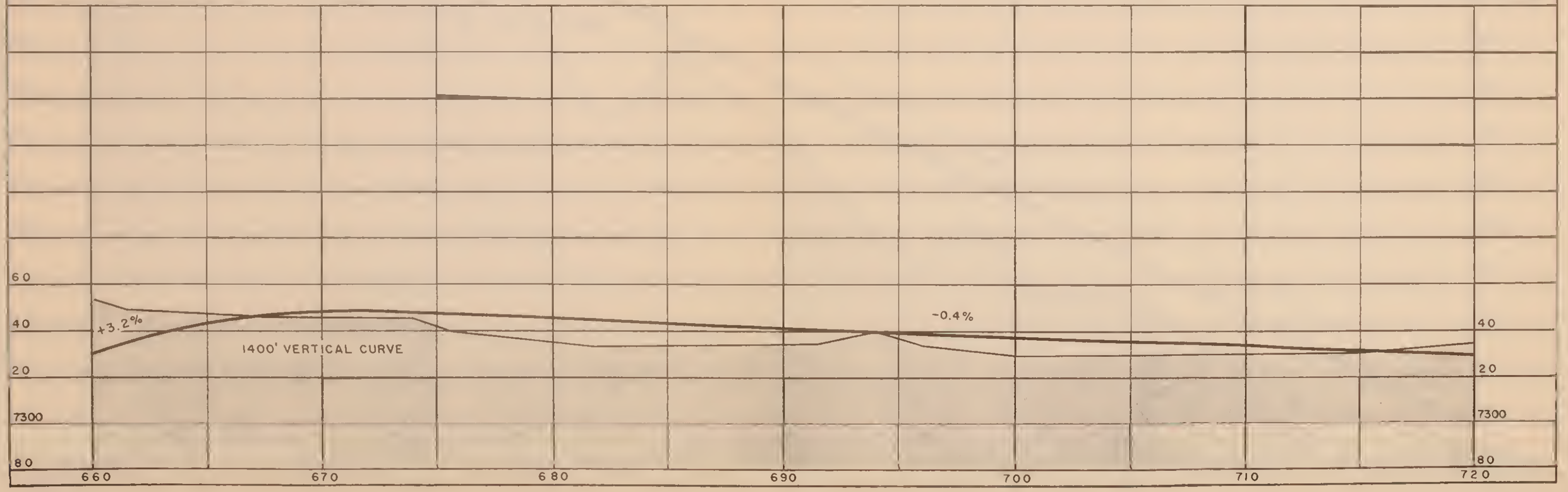
9 OF 22



SCALE

HORIZONTAL 0 100 200 400 FEET

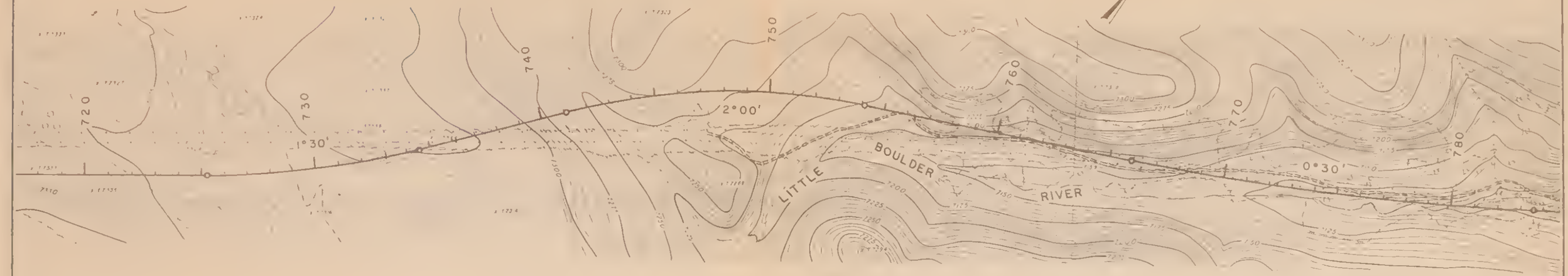
VERTICAL 0 10 20 40 FEET



NEZ PERCE ROUTE

STA. 720 —— STA. 780

10 OF 22



SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

-0.4%

1400' VERTICAL CURVE

-5.0%

7300 / 7200 / 7100

720 730 740 750 760 770 780

NEZ PERCE ROUTE

STA. 780 —— STA. 840

11 OF 22

LITTLE BOULDER RIVER

4°00'

2°30'

2°30'

780 790 800 810 820 830 840

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

-5.0%

-5.0%

NEZ PERCE ROUTE
STA. 840 — STA. 900
12 OF 22

LITTLE BOULDER RIVER

2°30'
4°00'
1°30'
3°30'

-5.0%
-5.0%

SCALE
HORIZONTAL
VERTICAL
0 100 200 400 FEET

NEZ PERCE ROUTE

STA. 900 — STA. 960

13 OF 22

MOOSE CREEK INTERCHANGE

LITTLE BOULDER RIVER

3° 30'

2° 00'

4° 30'

1° 30'

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

800' VERTICAL CURVE

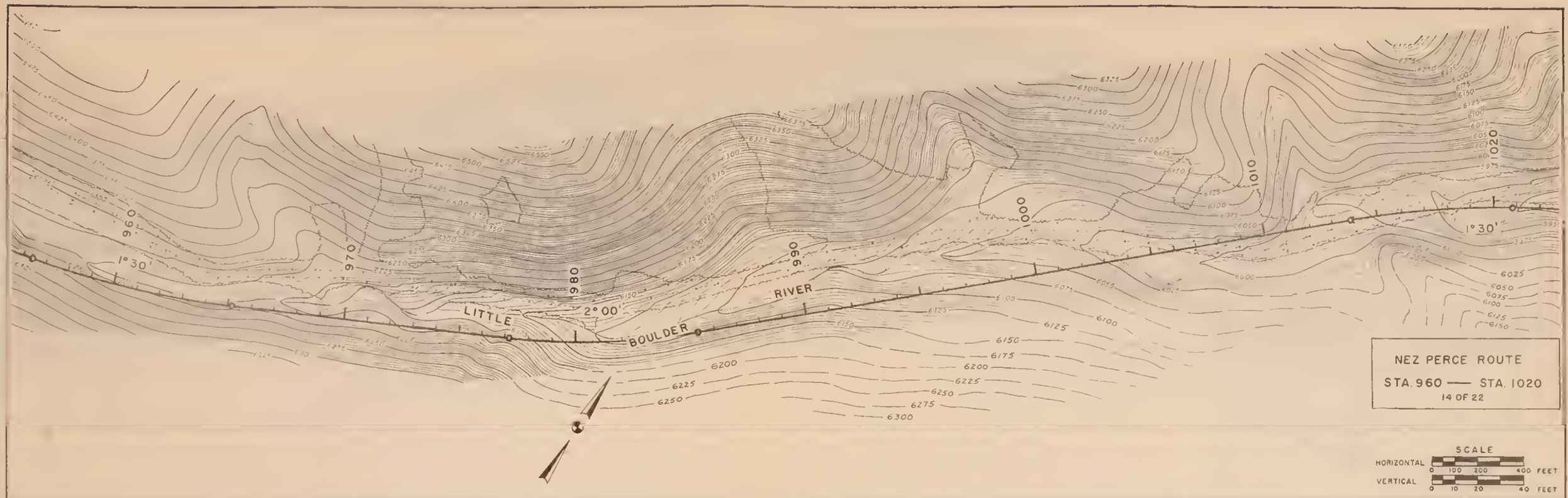
-4.5%

-4.5%

20
6500
80
60
40
20
6400

6400
80
60
40
20
6300
80
60
40
20

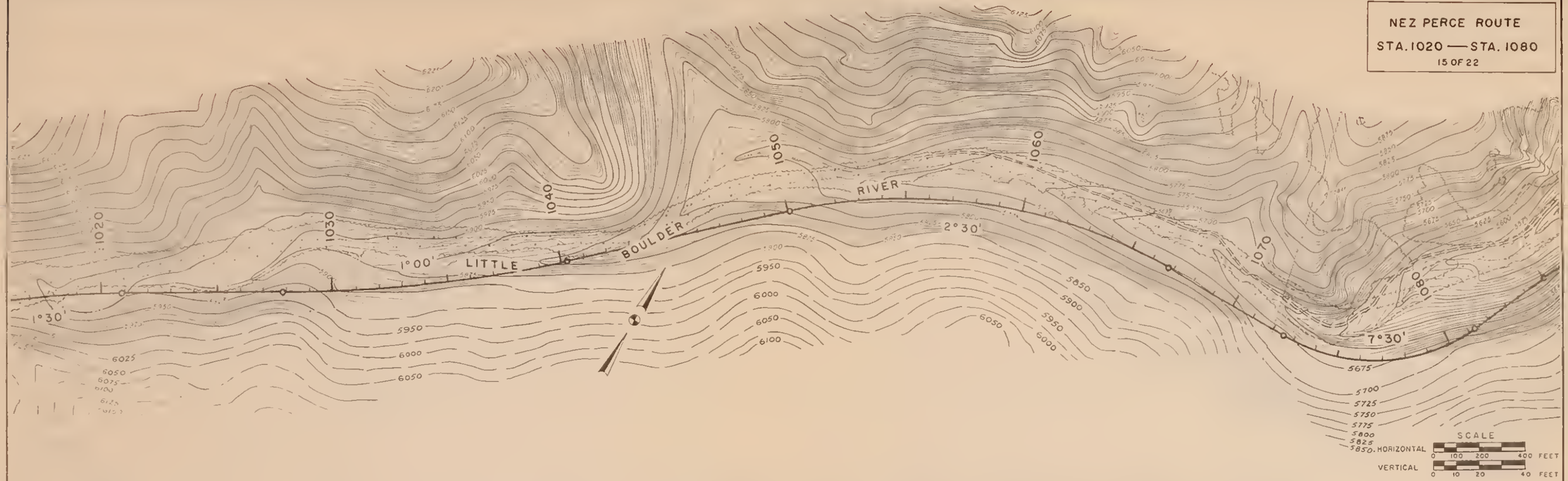
900 910 920 930 940 950 960

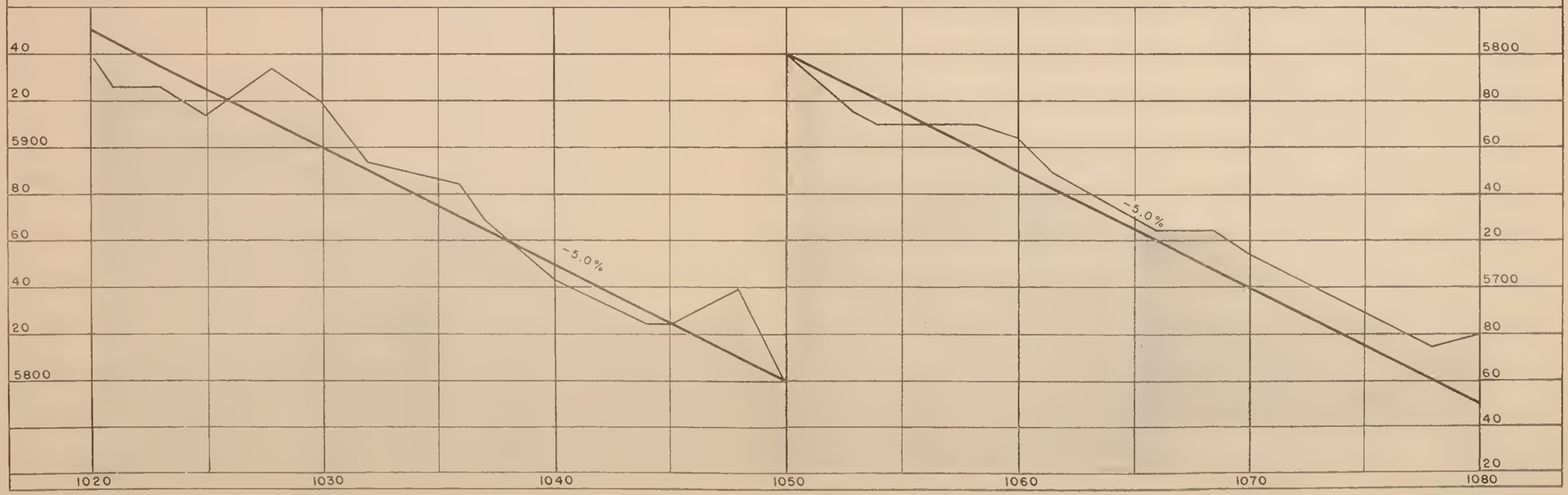

960
970
980
990
1000
1010
1020
1°30'
2°00'
LITTLE BOULDER RIVER
6000
6025
6050
6075
6100
6125
6150
6175
6200
6225
6250
6275
6300
NEZ PERCE ROUTE
STA. 960 — STA. 1020
14 OF 22
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET
-4.5%
-5.0%
-5.0%
800 VERTICAL CURVE
80
60
40
20
6200
80
60
6000
80
60
40
20
6100

NEZ PERCE ROUTE

STA. 1020 — STA. 1080

15 OF 22





NEZ PERCE ROUTE

STA. 1080 — STA. 1140

16 OF 22

NEZ PERCE ROUTE

STA. 1140 — STA 1200

17 OF 22

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 0 20 40 FEET

LITTLE BOULDER RIVER

2°30' 1°30' 2°00' 7°30' 7°30' 7°30'

1140 1150 1160 1170 1180 1190 1200

5250 5275 5300 5325 5350 5375 5400

-5.0%

-4.3%

800' VERTICAL CURVE

800' VERTICAL CURVE

60 40 20 0 40 80 5200 80

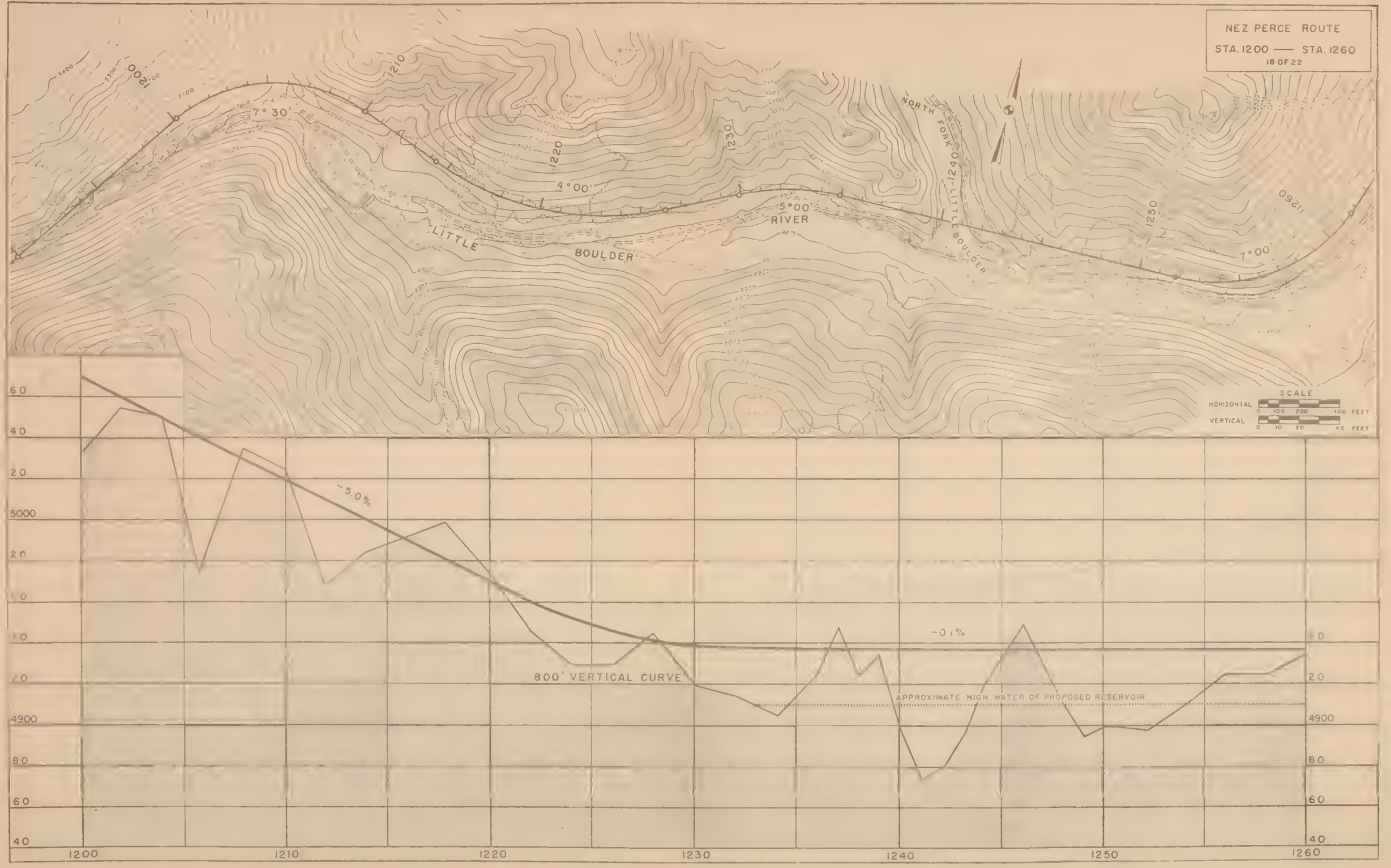
1140 1150 1160 1170 1180 1190 1200

60 40 20 0 20 40 60 80

NEZ PERCE ROUTE

STA. 1200 — STA. 1260

18 OF 22



NEZ PERCE ROUTE

STA. 1260 —— STA. 1320

19 OF 22

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

7°00'

4°00'

4°00'

2°30'

1260

1270

1280

1290

1300

1310

1320

LITTLE BOULDER RIVER

4848

APPROXIMATE HIGH WATER OF PROPOSED RESERVOIR

-0.1%

800' VERTICAL CURVE

+1.0%

800' VERTICAL CURVE

+3.0%

5000

4900

4800

4700

4600

4500

4400

4300

4200

4100

4000

3900

3800

3700

3600

3500

3400

3300

3200

3100

3000

2900

2800

2700

2600

2500

2400

2300

2200

2100

2000

1900

1800

1700

1600

1500

1400

1300

1200

1100

1000

900

800

700

600

500

400

300

200

100

0

40

20

80

60

40

20

4900

80

60

40

20

1260

1270

1280

1290

1300

1310

1320

NEZ PERCE ROUTE
STA. 1320 — STA. 1380
20 OF 22

SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

FAS 399
TO WHITEHALL

1320 1330 1340 1350 1360 1370 1380

+3.0%

2400' VERTICAL CURVE

-3 %

5000
80
60
40
20
4900
80
60

NEZ PERCE ROUTE
STA. 1380 — STA. 1440
21 OF 22

U.S. 91
BOULDER INTERCHANGE
Fr. Road
BOULDER
BOULDER RIVER
TO CARDWELL — 281
1380
1390
1400
1410
1420
1430
1440
1°30'
SCALE
HORIZONTAL 0 100 200 400 FEET
VERTICAL 0 10 20 40 FEET

+0.2%
+1.0%
-2.0%
800' VERTICAL CURVE
800' VERTICAL CURVE
800' VERTICAL CURVE
800' VERTICAL CURVE

60
80
4900
80
60
40
20
4800
80
20
4900
80
60
40
20
4800
1380
1390
1400
1410
1420
1430
1440

NEZ PERCE ROUTE

STA. 1440 — STA. 1480

22 OF 22

1440

1450

1460

1470

1480

1°00'

5000

NORTH COMMON POINT

TO HELENA

U.S. 91

SCALE

HORIZONTAL 0 100 200 400 FEET

VERTICAL 0 10 20 40 FEET

5000

80

60

40

20

4900

80

+3.0%

−0.1%

1200' VERTICAL CURVE

5000

80

60

40

20

4900

80

14+